Healthy Home Evaluator

Student Manual
March 2017

NATIONAL HEALTHY HOMES TRAINING CENTER™ & NETWORK

www.healthyhousingsolutions.com

Healthy Home Evaluator

Agenda

Day 1

Module 1: Course Overview and Introductions Time: 45 minutes	8:30 - 9:15
Module 2: Start With the Resident Time: 1 hour	9:15 - 10:15
Break	**10:15 - 10:30**
Module 2: Start With the Resident *(continued)* Time: 1 hour	10:30 - 11:30
Module 3: Visual Identification of Hazards Time: 30 minutes	11:30 - 12:00
Lunch	**12:00 - 1:15**
Module 3: Visual Identification of Hazards (*continued*) Time: 2 hours	1:15 - 3:15
Break	**3:15 - 3:30**
Module 4: Quantitative Measurement Introduction Time: 1.5 hours	3:30 - 5:00
End of Day 1	

Day 2

Site Visit: Travel to site, do assessment **(remember to bring your Visual Identification form)** Time: 1.5 hours	8:30 - 10:00
Site Visit: Quantitative assessment at site: **(remember to bring your Environmental Measures Worksheet)** Time: 1 hour	10:00 - 11:00
Site Visit: Quantitative tool demonstration & discussion (and travel from site back to training facility or lunch) Time: 1 hour	11:00 - 12:00

Agenda

Day 2 - *continued*

Lunch	**12:00 - 1:15**
Debrief on Site Visit: Identification/Justification of Hazards and Data Review Time: 2 hours	1:15 - 3:15
Break	**3:15 - 3:30**
Module 5: Justify and Prioritize Hazards Time: .5 hours	3:30 - 4:00
End of Day 2	

Day 3

Module 6: Personal Safety, Insurance and Liability Time: 1 hour	8:30 - 9:30
Module 7: Identify Interventions Time: 1 hour	9:30 - 10:30
Break	**10:30 - 10:45**
Module 7: Identify Interventions *(continued)* Time: 1.5 hours	10:45 - 12:15
Lunch	**12:15 - 1:15**
Module 7: Identify Interventions *(continued)* Time: 1 hour	1:15 - 2:15
Module 8: Communicate With the Resident Time: 1 hour	2:15 - 3:15
Break	**3:15 - 3:30**
Module 9: Review Time: 1 hour	3:30 - 4:30
End of Day 3	

NATIONAL HEALTHY HOMES
TRAINING CENTER™ & NETWORK

The National Healthy Homes Training Center and Network (Training Center) offers cutting edge training and professional development in the field of healthy housing. The Training Center has trained almost 28,000 people since its inception in 2003, and is creating a workforce that understands how to find and resolve hazards in the home environment. Visit the website at *healthyhousingsolutions.com/hhtc/.*

The Training Center:

- **Brings together public health and housing practitioners** to promote practical and cost-effective methods for making homes healthier.
- **Serves as a forum** for exchanging information on new research and best practices.
- **Promotes cross-training** of public health and housing practitioners.
- **Identifies and optimizes opportunities** for networking, collaboration, and partnerships.
- **Provides continuing education units (CEUs)** for most courses.

Training with a higher purpose

Our trainees are dedicated professionals committed to making a difference in their communities through safe and healthy housing. In 2009, the U.S. Surgeon General's *Call to Action to Promote Healthy Homes* underscored the public health importance of healthy housing and endorsed the "seven principles of healthy housing," which serve as the cornerstone of the Training Center's curricula.

Trainees learn critical skills and increase their knowledge of the principles, while also becoming inspired to serve as resources, thought leaders, conveners, and advocates in their communities.

The Training Center operates across the country and provides training through a network of experienced partners. To see a list of partners and their contact information, go to healthyhousingsolutions.com/hhtc/training-partners/.

The Training Center offers three types of courses to meet the needs of all students: (1) face-to-face, (2) online self-paced, and (3) online instructor-led.

Essentials for Healthy Homes Practitioners

This is the Training Center's flagship course. Over 14,000 students have taken the course, and nearly 97% of participants say they would recommend it to a colleague. Eighty-five percent say they could immediately incorporate the concepts they learned into their daily work.

This is what a few of our trainees have said about the Essentials course:

"The breadth of the course and practical application to in-home assessments (how to clean up mold, green cleaning supplies) was terrific. Plus the instructor's range of knowledge and experience was a great added value to the training materials."

"Information presented in practical, real world examples by presenter with solid experience with weatherization and healthy homes practices."

"The training was comprehensive and could relate to all types of homes."

Funding for the Training Center is provided by the U.S. Department of Housing and Urban Development (HUD)

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Classroom courses:

Code Inspection for Healthier Homes – This is a one-day course for code inspectors and others interested in learning more about how effective housing enforcement and programs can improve the health of occupants. The course provides information on the health-related provisions of state and local housing codes and the International Property Maintenance Code (IPMC).

Eco-Healthy Child Care Course® – The five-hour Eco-Healthy Child Care® Train-the-Trainer curriculum offers information on 11 core content areas: pesticides, poor indoor air quality, household chemicals, lead, mercury, furniture and carpets, art supplies, plastics, arsenic, radon and recycling. The course prepares individuals to become a resource for their localized communities.

Essentials for Healthy Homes Practitioners – If you visit homes to provide health or inspection services of any type, you will benefit from this course. The training will help you understand the connection between health and housing and how to take a holistic approach to identify and resolve problems that threaten the health and well-being of residents.

Green and Healthy Management Strategies for Multifamily Properties – This course provides property owners/managers with tools to implement green and healthy practices that can reduce energy, water, contaminants, and improve resident health conditions.

Healthy Home Evaluator Study Course – This course is designed to prepare students for the Healthy Home Evaluator certification offered through the Building Performance Institute (BPI). Students identify and evaluate health related hazards in a client's home. Students learn how to apply good practices to work with residents, identify housing-related health hazards, use tools to measure hazardous conditions, prioritize hazards, and identify and communicate solutions to residents. The course includes a site visit to a home and a number of case studies. Students will also learn how to protect themselves as they conduct home visits.

Healthy Homes Assessment and Interventions – This course enables students to learn about the importance of the resident interview, develop strategies for assessing the health-related hazards in a home, conduct an on-site inspection, and develop a comprehensive action plan.

Healthy Homes Assessment for Community Health Workers – This course enables is designed specifically for community health workers (CHWs), and other home visitors who provide health education to residents. The course provides these individuals with the knowledge and skills needed to perform a basic healthy home assessment.

Healthy Homes Assessment: Principles and Practice – This course provides knowledge and skills that individuals need to perform healthy home assessments. It is intended for those professionals who have completed either the Essentials for Healthy Homes Practitioners or the Healthy Homes Essentials for Environmental Professionals course and who plan to perform home assessments as part of their professional activities.

Funding for the Training Center is provided by the U.S. Department of Housing and Urban Development (HUD)

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Healthy Homes for Community Health Workers – This course teaches Community Health Workers (CHWs) how to provide healthy homes information to members of their communities. The course trains CHWs to provide one-on-one and large group education on healthy homes, provide general advice about specific healthy homes problems, and to recommend healthy homes approaches to be taken by families, landlords, and other community members.

Healthy Homes Essentials for Environmental Professionals – This course is an accelerated version of the Essentials for Healthy Homes Practitioners course for those individuals who already have certification as a professional in a healthy home field of expertise.

Health Opportunities in Energy Audits and Upgrades – This course provides an opportunity for energy auditors to learn about healthy homes and understand that energy efficiency is only one part of a safe and healthy home. Students become aware of a wider array of housing problems they will encounter and may be able to address once they are working in a home.

Integrated Pest Management in Multifamily Housing – This course is designed to help property managers implement a comprehensive integrated pest management (IPM) program by bringing stakeholders, especially resident leaders, together to develop the skills and practices needed to effectively eliminate pests such as cockroaches and rodents from multifamily housing. This course is available both in the classroom and online.

Launching a Healthy Homes Initiative – This course brings together health and housing professionals from state and local agencies as well as other health and housing organizations. The goal is to identify policies and practices to establish robust programs to make homes healthier. The course provides elements of a strategic planning process to initiate a healthy homes program in your community.

Online Self-Paced Courses:

Basic Principles of Healthy Housing – This course is engaging and interactive. Whether you're a community health worker, home assessor, home inspector, program manager, or anyone concerned about healthy housing, you will learn about the well-documented link between health and housing and become familiar with the eight principles of keeping your home healthy.

Eco-Healthy Child Care – This interactive course is designed for early care and learning professionals and those who offer technical assistance and/or training to child care providers. Parents will find it useful for the home environment as well. Learn why children are uniquely vulnerable to common environmental health hazards (e.g., lead, pesticides, household chemicals, unsafe plastics), and receive practical and low-cost to no-cost strategies for preventing children's exposures to toxic substances.

Integrated Pest Management in Multifamily Housing – This course is designed to help a property manager, including a public housing authority, to implement a comprehensive integrated pest management (IPM) program by bringing stakeholders, especially resident leaders, together to develop the skills and practices needed to effectively eliminate pests such as cockroaches and rodents from multifamily housing. This course is available both in the classroom and online.

Funding for the Training Center is provided by the U.S. Department of Housing and Urban Development (HUD)

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Pediatric Environmental Home Assessment – This course is designed to prepare nurses to recognize potential environmental hazards as part of a primary prevention approach, and recommend preventative action or make appropriate referrals for conditions that may be caused by a housing-related hazard.

Online instructor-led courses*:*

Bed Bug Management for Affordable Housing Providers – During this four-hour webinar, you will learn how to take an active role in solving common challenges, identifying problems, learning what strategies work to kill bed bugs, and how to find a good pest management professional.

Making Homes Healthier for Residents Who Hoard – This one-hour webinar discusses how hoarding impacts healthy homes. Participants learn about using a tool that helps a healthy home practitioner measure the level at which the resident's hoarding could have an impact on his or her health. They also learn about what does and does not work in addressing health-related hazards in a hoarder's house.

Making Homes Healthier for Residents With Limited Finances – This one-hour webinar will help participants identify alternative sources of funding for healthy home fixes. Instead of focusing solely on what their programs can pay for, participants will learn how to take a broader view on finding potential funds. Participants will also learn about the importance of starting locally when looking for resources, including programs that address housing repairs. Additionally, the webinar will provide a brief overview of federal and state programs.

To locate Training Center classes that are currently being offered, visit our Schedule of Classes at http://healthyhousingsolutions.com/register.

If you have any questions about the Training Center, contact Laura Titus at ltitus@healthyhousingsolutions.com.

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Healthy Home Evaluator

CERTIFICATION SCHEME HANDBOOK

THE SYMBOL OF EXCELLENCE FOR HOME PERFORMANCE CONTRACTORS

JUNE 12, 2017

Notice

A person, who is considering becoming certified as a Healthy Home Evaluator, needs to know what the scope of the certification is and what the requirements to become certified are.

This certification scheme handbook outlines the knowledge, skills and abilities needed for installers to be certified as a Healthy Home Evaluator.

Information in this handbook represents the policies at the date of publication for BPI Healthy Home Evaluator certification. Information in this handbook supersedes information contained in any previous published documents.

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Acknowledgements
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Disclaimer
Eligibility standards, exam content, exam standards, fees, and guidelines are subject to change. BPI will keep the most up-to-date version of this document posted at www.bpi.org. Prior to participating in any available service through BPI, check to ensure that you have based your decision to proceed on the most up-to-date information available. BPI reserves the right to modify documents prior to accepting any application.

Table of Contents

1. About BPI

Founded in 1993, the Building Performance Institute (BPI) is the nation's premier certification and standard-setting organization for home performance professionals. BPI is accredited by the American National Standards Institute, Inc. (ANSI) as a developer of American National Standards and as a certifying body for personnel credentials. BPI develops the technical standards for home energy audits and for energy efficiency, health, and safety improvements. From these standards, BPI develops rigorous written and field exams resulting in one of BPI's 14 professional certifications.

BPI also offers 3 programs (BPI GoldStar Contractor for companies, Rating Program for raters, and BPI Product Listing for manufacturers) and one certificate (Building Science Principles). BPI Certified Professionals hold over 18,000 active certifications supported by 130 BPI Test Centers and 340 Proctors. BPI has BPI Goldstar Contractors across the country.

BPI is a 501(c)3 corporation registered in the state of New York. The corporation was incorporated on January 18, 1996 and the corporation number is 14-1789014.The objective of the corporation is to provide credentialing for individuals and corporations involved in the residential retrofit industry. BPI is headquartered in Malta, NY.

2. BPI Certification Schemes

BPI offers individual certification in a number of areas in the residential retrofit industry.

The certification schemes are developed and then reviewed on an on-going basis by scheme committees made up of subject matter experts – individuals with the credentials and experience within the industry. The scheme committee review statistics, industry changes and current certification scheme requirements on a regular basis.

Industry input on each certification scheme is encouraged. The scheme committee members will seek input from external sources including, but not limited to:

- industry associations
- professional groups
- government agencies
- consumer/owner advocacy groups

The certification outlined in this handbook is for Healthy Home Evaluators who are involved in the retrofit of existing residential buildings. For a full listing of certifications, see the www.bpi.org website.

For individuals to become BPI certified, successful completion of a multiple-choice exam to confirm the candidate's knowledge and skills and a practicum evaluation is required to confirm the candidate's abilities.

To be certified by BPI, the candidate is not required by BPI to undergo any specific training, whether that would be on-site job training or classroom training, however, prerequisite criteria must be met. BPI does not approve any training programs. It is up to the individual to decide what training they want to take and where to take it, as it is solely their decision.

The requirements for this certification will be reviewed every five years and modified as required by the scheme committee with input from the residential retrofit industry. Modifications to the certification scheme will be made by BPI on the basis of the non-compliance cases, feedback from industry and technical changes to materials, components, systems, building codes or other relevant items.

3. Outline of the Healthy Home Evaluator Certification

This certification scheme handbook outlines the knowledge, skills and abilities requirements for the Healthy Home Evaluator credential.

The Healthy Home Evaluator credential builds upon the knowledge of the certified BPI Building Analyst Professional, BPI Energy Auditor, BPI Quality Control Inspector, or BPI Multifamily Building Analyst by establishing the competencies required to conduct an in-depth healthy home environmental risk assessment. The Healthy Home Evaluator assesses and characterizes home-based environmental health and safety hazards by integrating qualitative observations with quantitative diagnostics to determine and prioritize recommendations that address existing and potential hazards. The Healthy Home Evaluator communicates the identified risks and hazards to the occupant with the goal of improving health and quality of life.

This document is intended to include all of the tasks a Healthy Home Evaluator may perform, as well as the knowledge, skills, and abilities required to do these tasks.

Please note that certification is not a license to practice. All certified persons must comply with applicable federal, state and local laws and regulations governing the profession.

4. Multiple Choice Exams

For this certification, a multiple-choice test instrument will be administered in order to ensure competency in the critical tasks defined by BPI.

The multiple-choice exam is comprised of fifty (50) questions that cover knowledge and skills and will be timed at one (1) hour and thirty (30) minutes (1 ½ hrs) will be allowed for the timed test. The multiple-choice exam consists of multiple versions, each determined to have its own minimum passing score through psychometric analysis and the Modified Angoff standard-setting procedure. The results page during the online exam session will indicate whether a candidate was successful or not based on the version they were administered.

This exam is a closed-book exam.

Future discussion or disclosure of the content of the exam, orally or in writing, or by any other means, is prohibited. Theft or attempted theft of exam items is punishable to the fullest extent of the law.

Candidates will be observed at all times by a BPI Test Center Proctor while taking the exam. This includes direct observation by the examiner as well as audio and video recording of the examination. Any participation in irregular behavior during the exam may result in the invalidation of the results of the exam, termination of a candidate's status, civil liability, criminal prosecution, or other appropriate sanctions.

5. Exam Retake Policy

Once an exam is completed, candidates must wait a minimum of one hundred sixty-eight (168) hours [seven (7) twenty-four (24) hour days] before a retake exam may be attempted.

6. Examination Security

Examinations are highly confidential materials. Any attempts to willfully compromise the integrity of the examination, the examination process or the certification process shall be taken seriously; offenders may be prosecuted to the fullest extent of the law. In addition, any certification credential may be revoked immediately if a breech is proven to have been made by a certified individual.

7. Functions and Tasks

The Healthy Home Evaluator assesses and characterizes home-based environmental health and safety hazards by integrating qualitative observations with quantitative diagnostics to determine and prioritize recommendations that address existing and potential hazards. The Healthy Home Evaluator communicates the identified risks and hazards to the occupant with the goal of improving health and quality of life.

I. Principles of a Healthy Home (i.e., Keep it Healthy)

A. Understanding of the key components to keeping a home healthy by maintaining an environment and structure that is:

1. Dry
2. Clean
3. Pest-free
4. Safe
5. Contaminant-free
6. Ventilated
7. Maintained
8. Energy-efficient

II. Data Collection

A. Environmental history taking (considering both persons and home; e.g., behavioral, health literacy, language and readability)

B. Qualitative and quantitative assessment

1. Qualitative assessment (e.g., visual, sensory, semi-quantitative)

    a. Knowledge of building and surroundings (including structure)
    b. Knowledge of mechanical equipment/systems
    c. Knowledge of condition and locations of appliances
    d. Knowledge of general room assessment, such as:

        i. Air-flow and circulation
        ii. Allergens and dust
        iii. Moisture control
        iv. Chemical exposure

v. Safety and injury prevention
vi. Safety data sheet

2. Quantitative assessment

a. Measurement

i. Air-flow / Envelope

a. Knowledge of the application of limited pressure mapping/series leakage
b. Exposure pathway assessment
c. Knowledge of duct leakage diagnostics
d. Knowledge of limited HVAC system flow

ii. Moisture control

a. Knowledge of indoor RH
b. Knowledge of moisture mapping
c. Knowledge of conditions for microbial colonization/moisture level

b. Basic concepts and principles related to environmental sampling (e.g., VOC, formaldehyde, radon)

i. Knowledge of basic sampling techniques, such as:

a. Chemical
b. Biological
c. Particle

ii. Specific contaminants (e.g., radon)
iii. Knowledge of regulatory overview

C. Knowledge of At-Risk Populations (e.g., children, seniors, mobility, mental health)
D. Knowledge of specific contaminants and environmental situations

1. Lead-based Paint

a. General Knowledge Areas

iv. age of house
v. condition of the lead paint
vi. children in the house
vii. general understanding of the health implication
viii. health questionnaire
ix. understand own state rules and regulations
x. concentrate on children 5 and under
xi. knowing when to do a certified lead assessment
xii. EPA – Renovate Right Form

2. Dampness and Mold Growth

a. General Knowledge Areas

i. sources of dampness – bulk, occupant, etc.
ii. visual inspection
iii. psychometrics

iv. vulnerable populations
v. sources
vi. pathways (internal /external)
vii. strength risk
viii. interview of occupants with asthma
ix. can detect odors of dampness
x. Relative humidity measurements
xi. surface moisture meter
xii. fan flow on exhaust
xiii. confirm ducting terminates outside
xiv. dryer venting or terminates to outside

3. Asbestos and MMF Fibers

    a. General Knowledge Areas

        i. understand the difference between friable and non-friable
        ii. what are the common HVAC building materials where we find asbestos
        iii. health aspects of asbestos
        iv. remodeling concerns
        v. visual awareness of what asbestos components are in the home when doing the inspection
        vi. good resource information available – EPA
        vii. remind inspectors to not call items asbestos until it is tested/confirmed
        viii. asbestos containing material that is prescribed

4. Carbon Monoxide

    a. General Knowledge Areas

        i. low level exposure health effects, low levels can exist in the home without the alarm going off (75ppm)
        ii. they do make detectors that will detect low levels
        iii. knowledge of CO standards action levels
        iv. sources of CO
        v. placement of detectors

5. Fire hazards

    a. General Knowledge Areas

        i. improper storage of soiled materials
        ii. improper venting materials
        iii. unprotected wires
        iv. dryer lint build up
        v. improper storage of combustibles
        vi. fire escape plan (review with the family or provide)
        vii. smoking in bed/candles
        viii. hot plates
        ix. Kerosene heater

x. overloaded circuits
xi. improper chimney cleaning/creosol
xii. smoke detectors – existing/operational/location ungrounded electrical outlets
xiii. knob and tube

6. Explosion
    a. General Knowledge Areas
        i. evaluator look for compressed gas cylinders
        ii. oxygen tanks
        iii. limited access to fuels/chemicals
7. Structural Issues
    a. General Knowledge Areas
        i. unsafe stairs
        ii. stair well
        iii. additions to homes/poorly constructed
        iv. decks
        v. porches
        vi. assessment of foundation condition/chimney
        vii. knowledge of when to call in a professional assessment
        viii. improper or poor renovation work (general awareness)
        ix. interview process
        x. knowledge of code issues
        xi. assess exterior components for obvious damage including roofs, flashing, siding and guttering, ceiling, flooring and walls – structural sound
8. Trips and Falls
    a. General Knowledge Areas
        i. evaluate the condition of the stairs and hand rails – present and stable
        ii. proper lighting
        iii. consistent rise/run
        iv. broke treads
        v. disconnected runners
        vi. knowledge of specific codes
        vii. information on ways to ensure windows are safe from falls given current occupancy – determined during interview
        viii. drowning potential
        ix. grab bars present
        x. lighting needs
        xi. foot grips present
9. Electrical Hazards
    a. General Knowledge Areas

i. extension cord wiring
ii. open splices
iii. sliced wiring outside junction boxes
iv. knob and tube wiring
v. visual ID
vi. overhead wiring and line height
vii. entrance cable clearance
viii. GFCI where appropriate – trip GFCI with tester
ix. knowledge of when full electrical inspection necessary

10. Excess Cold

    a. General Knowledge Areas

        i. house able to keep acceptable heating and cooling
        ii. health aspects of areas too hot or cold

11. Hot surfaces, etc.

    a. General Knowledge Areas

        i. setting DHW temp to proper temp to avoid burns
        ii. hot plates/stove top/ wood stoves / steam radiators, pellet stoves, etc. within reach by a child,
        iii. measurement of DHW temp at tap
        iv. bath tub temp

12. Domestic Hygiene, Pests, etc.

    a. General Knowledge Areas

        i. components of IPM (3 components)
        ii. eliminate gaps
        iii. cracks
        iv. openings
        v. eliminate harborage sites
        vi. eliminate food/water sources
        vii. use of traps and gels and monitoring stations
        viii. least toxic control methods
        ix. HEPA rated vacuum – use of and industry knowledge
        x. green cleaning choices
        xi. signs of pests and knowledge of health aspects
        xii. indoor dust
        xiii. issues with plumbing and pipes – usage

13. Radiation (Radon)

    a. General Knowledge Areas

        i. education of radon health risks and entry methods, provide informational pieces, Awareness and education piece on awareness and testing options
        ii. WX work may limit radon entry – or make worse
        iii. other sources of radon – natural stone countertops

iv. emphasis on health affects # 2 lung cancer – combined with smoking

14. VOC

    a. General Knowledge Areas

        i. focus on education on VOC hazards and prevention – can be extremely expensive to test for
        ii. materials brought in by homeowner, materials for work being performed, encapsulation techniques, health effects are very individualized

15. Biocides

    a. General Knowledge Areas

        i. education and awareness on poisons and pesticides on indoor environment
        ii. exist/stored/used in homes
        iii. less toxic solutions – fertilizers, cleaning products, health effects are very individualized
        iv. potential to become entrapped in carpets, etc.
        v. vulnerable populations- children and developmental issues
        vi. asthma triggers
        vii. issues with plumbing and pipes – usage

16. Lighting

    a. General Knowledge Areas

        i. benefits of natural lighting
        ii. security benefits for property
        iii. safety aspects for sufficient task lighting, knowledge of key areas – trip and fall areas, kitchen lighting, existing lighting functionality, hazards of toxins and disposal safety

17. Food Safety

    a. General Knowledge Areas

        i. ensure appliances are working properly
        ii. fridge and freezer temps – must measure
        iii. proper food disposal and kitchen hygiene
        iv. clean prep surfaces

18. Crowding and Space

    a. General Knowledge Areas

        i. signs of over population
        ii. health effects of crowded spaces/trip fall/increased risk for sickness
        iii. clutter prevents proper cleaning
        iv. occupying rooms not intended for use

19. Entry by Intruders

a. General Knowledge Areas

i. doors and windows lock properly
ii. secure jambs and sashes
iii. potential for basement entry – failing doors/windows
iv. exterior lighting levels

20. Noise

a. General Knowledge Areas

i. stress levels created by elevated noise levels and associated health affects

III. Analysis and Interpretation

A. Knowledge of using analysis tools and resources
B. Knowledge of interpreting quantitative and qualitative assessment findings related to evidence-based practice (e.g., radon, moisture level)
C. Knowledge of evaluating quantitative and qualitative assessment results that do not have evidence-based practice

IV. Recommendations and/or Scope of Work

A. Knowledge of identifying recommendations/interventions based on analysis of assessment findings
B. Knowledge of assisting clients in prioritizing recommended measures based on specific findings
C. Knowledge of developing scopes of work
D. Knowledge of making referrals

V. Communication and Client Education

A. Knowledge of written client communication
B. Knowledge of non-specific language, sensitivity to client needs (e.g., healthy home literacy, housing maintenance literacy, psychosocial factors)
C. Knowledge of external communication (e.g., communicating with partners, referrals, subcontractors)
D. Knowledge of justification and persuasion
E. Knowledge of communicating with at-risk populations

VI. Personal Safety, Insurance, and Liability

A. Knowledge of personal protective equipment (PPE)
B. Knowledge of occupant protection
C. Knowledge of health advice vs. healthy home advice
D. Knowledge of scope of services
E. Knowledge of liability principles
F. Knowledge of regulations that related to healthy home assessment
G. Knowledge of in-home physical and environmental hazards

8. Healthy Home Evaluator Blueprint

Domains	Percentages
I. Principles of a Healthy Home (e.g., Keep it Healthy)	8% - 10%
II. Data Collection	38% - 42%
III. Analysis and Interpretation	18% - 20%
IV. Recommendations and/or Scope of Work	18% - 20%
V. Communication and Client Education	5% - 10%
VI. Personal Safety, Insurance, and Liability	8% - 10%

9. Standards of Reference

All BPI exams are based on a mixture of industry practices, axiomatic[1] concepts, and major standards of references. No singular source exists that could touch upon every aspect for what is considered testable. Conversely, there is no limit to the potential useful material found in print and online.

Please refer to the standards list found online at www.bpi.org/hhe.

10. Preparing for Certification

Before you register for the examination:

- Download the latest version of this handbook from www.bpi.org
- Read all information contained in this handbook in its entirety
- Refer to the Functions and Tasks contained in this handbook to be sure that you understand and are capable of performing the tasks required of this certification.
- Obtain any reference materials required for the multiple choice exam study these references well in advance of taking the examination

10.1 Prerequisites

All items below are required prior to taking the multiple-choice exam:

- **Must hold a current BPI Building Analyst Professional, BPI Energy Auditor, BPI Quality Control Inspector, OR BPI Multifamily Building Analyst Certification and the certification must remain current in order for the Healthy Home Evaluator certification to remain current.**

10.2 Special Testing Accommodations

Candidates in need of special testing accommodations, such as a language barrier, or arrangements for persons with disabilities, will submit the appropriate forms as noted in Appendix (C and D).

[1] An axiomatic concept is something implicit that requires no proof or explanation (e.g. – the sum of 2 and 2 is 4, or gravity states that if you drop something, it will fall to a lower level).

It is highly recommended that you submit your request for accommodation at least 30 days prior to your preferred exam date.

10.3 Proof of Identity

Candidates must show photo identification prior to taking the exam. Please note that photo ID cannot be expired. Be sure to register with the exact same name that will be presented as identification at the exam location or you will not be allowed to take the exam.

Examples of acceptable forms of photo ID are:

- driver's license
- passport
- military identification
- employee identification card

10.4 Certification Fees and Scheduling

Candidates take this examination through BPI Test Centers. Test Center fees and dates the exams are available vary from Test Center to Test Center. BPI does not set these prices or times nor does BPI collect the examination fees. When attempting certification through a Test Center contact the Test Center for Test Center fees and scheduling details of examinations. To locate a Test Center please go to our website (www.bpi.org) and select BPI Test Centers under the 'Locator' tab at the top of the page.

11. Granting

The certification prerequisites must be met as well as successful scores on the multiple choice and practical examinations to receive certification.

11.1 Notification of Test Results and Certification

When test results are processed the candidate is automatically notified by email that their test results are ready to view. To view the test results the candidate must log in to the Candidate Account.

When the individual has achieved certification, an automatic email is sent to the candidate stating that certification has been awarded. Once this notification is sent a temporary certificate can be downloaded and printed from the Candidate Account. BPI will also provide the individual with a packet containing a congratulatory letter on achieving certification, a certificate of certification and a photo identification card. These certification packets typically arrive thirty (30) days after exam is received by BPI although times may vary.

The certificate and the photo identification card shall expire in three (3) years from the date of last qualifying exam.

The photo identification certification card shall contain, but is not limited to:

- name of the certified candidate
- candidate's identification number

- BPI's name and logo
- reference to a certification scheme (name of certification)
- date when certification expires

11.2 Time Limits for Completing Certification

BPI permits six (6) attempts to pass the multiple-choice exam in a one-year time period.

11.3 Confidentiality of Information

BPI and BPI Test Centers shall adhere to all policies and procedures regarding candidate confidentiality and shall not release any information regarding any candidate or certified professional without obtaining prior written permission. Forms for this purpose are provided as part of the application. This disclosure form is intended to assist BPI and the BPI Test Center to protect your information.

12. Maintaining Your Certification

The Healthy Home Evaluator certification is valid for three (3) years as long as one of the prerequisite certifications is maintained.

If a candidate's prerequisite certification expires during the period of the HHE certification, the HHE will be deactivated until the prerequisite certification is achieved. Once the prerequisite certification is achieved the HHE will resume with its original expiration date.

While there are no annual fees to maintain your certification you will be subject to surveillance as outlined in this document.

13. Recertification

The certified Healthy Home Evaluator will be required to renew their certification every three (3) years. The candidate will receive a courtesy email notification at 120, 90, 60 and 30 days reminding them their certification will expire. Candidates will be allowed to start the recertification process six (6) months prior to expiration. If recertification is completed more than six (6) months in advance the expiration date will change to the date of last exam.

Recertification is obtained by taking the written exam.

As part of the recertification process BPI will review the certified Healthy Home Evaluator's file for any open complaints.

The recertification requirements for certified Healthy Home Evaluators must be completed prior to re-issuance of the certification. Should there be any open complaints at the time of expiration BPI will not award recertification.

The certification of the individual shall be withdrawn or revoked due to the certified person's negligent refusal to follow the certification scheme requirements.

***Any attempt at recertification that is unsuccessful will end the current certification. (e.g. if an attempt at the HHE exam for recertification is unsuccessful, that will end the current HHE certification immediately.)**

14. Surveillance

Surveillance of the certified person is established to ensure compliance to the Policies and Procedures for which the certification was granted. The certification of the individual shall be withdrawn or revoked due to certified person's negligent refusal to follow the certification scheme requirements or failure to take appropriate corrective action as dictated by BPI.

15. File Review

The certification department shall conduct a file review of certified persons that have complaints filed against them. The review of the certified person's file activities includes confirmation that any complaints against the certified person have been resolved.

16. Corrective / Preventative Action

The corrective / preventative action shall include one of the following:

Level One: This corrective action shall be taken when the infraction is minor in nature. A written warning shall be sent to the certified person about the infraction along with the required corrective action. This written warning shall become part of the record in the person's file.

Level Two: This corrective action shall be taken when the infraction requiring proof of corrective action. A written warning is sent to the certified person about the infraction. The person is required to submit proof of correction in writing that the infraction has been corrected. The warning and the written response will become part of the record in the person's file.

17. Withdrawal of Certification

Should the certified Healthy Home Evaluator not maintain certification or not submit requested proof of corrective action to the satisfaction of BPI, the certification will be withdrawn. In the event the certification is withdrawn; the BPI certification operations manager will review the certified Healthy Home Evaluator's record and provide a written statement in regard to steps that will be taken in order for the certification to be reinstated. Use of the BPI logo or brand and representation of being BPI certified must cease immediately if a certification is withdrawn, revoked, or expired.

Reasons for withdrawal of a Healthy Home Evaluator's certification by BPI include, but are not limited to:

- Failure of the multiple-choice exam upon recertification.
- Expiration of one of the prerequisite certifications.
- Failure to take steps to submit requested proof of corrective action.

BPI shall be notified immediately if a certified individual may not be able to or is no longer able to fulfill the requirements of the certification.

18. Appeal Procedure

Candidates who wish to file an appeal of a decision on certification, against the results of an exam, or regarding the suspension of a certification, must do so in writing.

Appeal Process for Exam Review

To contest the results of an exam, the candidate must follow the procedures, below:

1. A request for review must be made within thirty (30) business days from the date of the exam results. The request for review should be made, in writing, through the BPI website, or sent via registered mail, or email, to the Manager of Certifications Operations at BPI.

From the BPI website (www.bpi.org), under “Contact Us’ select the Complaint Form and choose Exam Grade Appeal from the dropdown menu.

To send via registered mail, send requests for review to:

Building Performance Institute, Inc.
Attn: Appeals
107 Hermes Road, Suite 210
Malta, NY 12020

To send via email, send requests to: complaints@bpi.org

2. The request for review must specifically state the reasons why the candidate believes the initial decision should be modified or overturned and provide information on the issue, or provide a specific reference where required procedures have not been followed.

3. The review will be carried out by the Quality Assurance (QA) Department. Review results will be forwarded to the Director, who will provide a decision, in writing, within thirty (30) business days of receiving the written determination of the reviewer.

4. If the Director concludes that the actions taken are valid, the candidate will be notified of the decision, in writing. The candidate will receive a letter by email, courier or registered mail. The candidate is deemed to have received the notice of the written review decision seven (7) business days after the notice is sent.

Appeal Process for Suspension of Certification

For a review of suspension or withdrawal of certification, the candidate must follow the procedures, below:

1. A request for review must be made within thirty (30) business days of the notice of suspension or withdrawal of certification from the date of the exam results. The request for review must be made, in writing, through the BPI website, as noted above, or sent via registered mail or email to BPI at the addresses listed above.

2. The request for review must specifically state the reasons why the candidate believes the initial decision should be modified or overturned, and provide new information on the issue or provide a specific reference where required procedures have not been followed.

3. The review will be carried out by the QA Department. The QA Department will forward the results to a Director, with a request to provide a decision, in writing, within thirty (30) business days of receiving the written request for review.

4. If a Director concludes that the actions taken are valid, the candidate will be notified of the conclusion, in writing. The candidate will receive a letter by email, courier or registered mail. The candidate is deemed to have received the notice of the written review decision seven (7) business days after the notice is sent.

19. Complaints

If you would like to file a complaint concerning any aspect of the certification or testing process, work performed by other BPI certified individuals, or any other BPI related concerns, please use the complaint form in the sub menu under 'Contact Us' on the top of the page at www.bpi.org or email complaints@bpi.org.

All complaints must be submitted in writing.

Appendix A – Code of Conduct

1. Code of Conduct

Certification may be denied, suspended, or revoked, if an individual is not in compliance with this Code of Conduct. Grounds for disciplinary action include (but are not limited to):

1. An irregular event in connection with an examination, including (but not limited to) copying examination materials, causing a disruption in the testing area, and failure to abide by reasonable test administration rules;
2. Taking the exam for any purpose other than that of becoming certified in the technical area referenced in the title of the exam;
3. Disclosing, publishing, reproducing, summarizing, paraphrasing, or transmitting any portion of the exam in any form or by any means, verbal, written, electronic or mechanical, without the prior expressed written permission;
4. Providing fraudulent or misleading information;
5. Failure to pay fees when due;
6. Unauthorized possession or misuse of certifications;
7. Misrepresentation of certification status;
8. Failure to provide requested information in a timely manner;
9. Impairment of professional performance because of habitual use of alcohol, drugs, or other substance, or any physical or mental condition;
10. Gross or repeated negligence or malpractice in professional work;
11. Failure to maintain a current professional credential as required by the jurisdiction in which the individual practices (this may include a license, certificate, or registration);
12. The conviction of, plea of guilty to, or plea to a felony or misdemeanor related to public safety or the building industry;
13. Disciplinary action by a licensing board related to a building industry; and
14. Other failure to maintain continuous compliance with the certification standards, policies, and procedures related to your certification.

2. Disciplinary Actions

The following disciplinary actions may be taken as a result of non-compliance with this Code of Conduct:

- Denial or suspension of eligibility;
- Denial of certification;
- Revocation of certification;

- Non-renewal of certification;
- Suspension of certification;
- Reprimand; or
- Other corrective action.

Appendix B – BPI Certification Agreement

BPI Certification Agreement

Healthy Home Evaluator applicants will be required to accept BPI's Candidate Certification Agreement before beginning your exam. Make sure to read and be familiar with this agreement before you take your exam.

BY SIGNING YOU ARE AGREEING TO THE TERMS AND CONDITIONS OF THIS CANDIDATE CERTIFICATION AGREEMENT. CANDIDATE OR CERTIFIED INDIVIDUAL MAY TAKE THE EXAM ONLY IF CANDIDATE OR CERTIFIED INDIVIDUAL AGREES TO THE TERMS AND CONDITIONS OF THIS AGREEMENT. IF CANDIDATE OR CERTIFIED INDIVIDUAL DOES NOT AGREE TO THE TERMS AND CONDITIONS, CANDIDATE OR CERTIFIED INDIVIDUAL SHALL SELECT "NO, I DO NOT AGREE" BELOW AND WILL NOT BE ALLOWED TO TAKE THE EXAM.

BPI and Candidate or certified individual hereby agree that the terms and conditions of the Agreement shall govern Candidate or certified individual's participation in BPI's Certification Exam and BPI's Certification.

1. CERTIFICATION
   a. The Candidate or certified individual must:
      - meet the prerequisites
      - pay the applicable exam fees;
      - accept the terms and conditions of this Agreement before completing the Exam;
      - pass the exam(s)
      - keep contact information up to date
   b. Modification to Certification Requirements. BPI's Director level staff may expand or reduce the title or scope of the desired certification or withdraw the certification.
   c. Termination. Candidate or certified individual may terminate this Agreement at any time upon written notice to BPI. The Certification or certified individual is valid for a period of three (3) years after the date of passing the last qualifying exam. If the candidate or certified individual chooses to terminate this agreement prior to the expiration date of their certification, the certification, including all related material, must be surrendered and will be void. Upon termination of this Agreement and after the expiration of the Certification, all rights related to the Candidate's Certification, including all rights to use the Certification and the Logo, will immediately terminate.
2. COMPLIANCE WITH TESTING REGULATIONS

Candidate or certified individual agrees to comply with all testing regulations required by BPI and/or its Test Centers and testing centers.

   d. No Cheating. Candidate or certified individual agrees that all answers submitted in completing the Exam and are entirely their own. Candidate or certified individual will neither: (i) provide nor accept improper assistance; nor (ii) use unauthorized materials in attempting to satisfy Certification Requirements.
   e. No Misconduct. Candidate or certified individual agrees not to (i) falsify his or her identity or impersonate another individual; (ii) forge the Certification, Exam score reports, identification cards or any other Exam records; (iii) engage in fraudulent conduct or misrepresent him or herself as Certified when he or she has not successfully met the applicable Certification Requirements; (iv) misuse or disclose username and/or password or any other Certification identities; and/or (v) engage in any other misconduct that could be considered by BPI, in its sole discretion, as compromising the integrity, security or confidentiality of the Exam or the Certification.
   f. No Disclosure. Candidate or certified individual understands and agrees that the Exam is BPI's confidential and proprietary information. Candidate or certified individual agrees to maintain the confidentiality of the Exam and not disclose, whether verbally, in writing or in any media, the contents of the Exam or any part of the Certification. Further, Candidate or certified individual agrees not to request any other individual to disclose the Exam or any part thereof to the Candidate or certified individual.

g. No Misuse of the Exam. Candidate or certified individual agrees not to copy, publish, offer to sell, sell, publicly perform or display, distribute in any way or otherwise transfer, modify, make derivative works thereof, reverse engineer, decompile, disassemble or translate the Exam or part thereof.

3. BPI ACTION FOR NON-COMPLIANCE
   h. Candidate or certified individual understands and agrees that, if for any reason and at its sole discretion, BPI believes the Candidate or certified individual violated the terms of this agreement or the criteria against which the competence of a person is evaluated in accordance with the scheme of the certification. BPI has the right to deny Candidate or certified individual any further participation in the Exam, cancel a passed Exam result, remove the Candidate or certified individual's certified status and any other rights previously conferred on the Candidate by BPI, and to permanently bar Candidate or certified individual from any further participation in BPI's Certification.
4. WITHDRAWAL OF CERTIFICATION
   i. Should the certified individual not maintain or not continue to prove their competence for this certification to the satisfaction of BPI, the certification will be withdrawn. In the event the certification is withdrawn, the BPI certification operations manager will review the certified individual's record and provide a written statement in regards to steps that will be taken in order for the certification to be reinstated.

Reasons for withdrawal of an individual's certification by BPI include, but are not limited to:

- Failure of the multiple choice test instrument.
- Failure of field evaluation.
- Verification of a complaint by building owner or the owner's representative for failure to meet installation requirements and then not correcting the deficiency.
- Failure to take steps to correct improper practices.

   j. If the certified individual may not be able or is no longer able to fulfill the requirements of the certification the certified individual must notify BPI immediately and surrender all certification documents, such as BPI ID Card and BPI Certificate to BPI, and cease using any logo or marketing materials.
5. REPRESENTATIONS AND WARRANTIES
   k. By the Candidate or certified individual. Candidate or certified individual represents and warrants that: (i) Candidate or certified individual will refrain from any conduct that may harm the goodwill and reputation of BPI or its products and (ii) Candidate or certified individual shall not make any representation, warranty or promise on behalf of or binding upon BPI and (iii) Candidate or certified individual shall not make claims regarding certification outside of the intended scope of the appropriate certification.
   l. Candidate or certified individual agrees to not use the certificate in a manner that is misleading or unwarranted.
6. INDEMNIFICATION
   m. Candidate or certified individual agrees to indemnify, defend and hold BPI harmless against any losses, liabilities, damages, claims and expenses (including attorneys' fees and court costs) arising out of any claims or suits, whatever their nature and however arising, in whole or in part, which may be brought or made against BPI, or its Test Centers, officers, employees or assigns, in connection with: (i) any personal injury, property damage or other claims which are caused, directly or indirectly by any negligent act, omission, illegal or willful misconduct by the Candidate or certified individual, (ii) Candidate or certified individual's use or misuse of the Certification and/or the Logo; (iv) Candidate or certified individual's use or misuse of BPI' confidential information; and/or (v) Candidate or certified individual's breach of any obligations or warranties under this Agreement.
7. LIMITATION OF LIABILITY
   n. Damages. BPI shall not be liable for any indirect, incidental, special, punitive, or consequential damages or any loss of profits, revenue, or data. BPI's liability for direct damages, whether in contract, tort or otherwise, shall be limited to the fees paid to BPI under this Agreement.
8. CONFIDENTIALITY UNDERTAKING
   o. By signing this Agreement, Candidate or certified individual agrees to all terms and conditions herein
   p. Candidate agrees (i) to hold Confidential Information in confidence and take all reasonable precautions to protect it, (ii) not to, directly or indirectly, use Confidential Information at any time during the certification procedure, the performance of the Exam and thereafter, and (iii) not to, directly or indirectly, disclose, publish, reproduce or transmit any Confidential Information completely or in part to any third party, in any form, including but not limited to verbal, written, electronic or any other means for any purpose without the prior express written permission of BPI.

q. BPI retains all rights, title and interest in and to all information, content and data contained in the Exam and all copyrights, patent rights, trademark rights and other proprietary rights thereto provided by BPI under the certification procedure and Exam.

Upon any breach by the Candidate or certified individual of the confidentiality undertaking in the Candidate Certification Agreement, BPI may automatically and without notice withdraw Candidate's Certification. Further, BPI is entitled to pursuing any other available remedy for unauthorized disclosure or for breach of the confidentiality undertaking in said Agreement.

Appendix C – Candidates with Special Testing Accommodations

Candidates with Special Testing Accommodations

The Americans with Disabilities (ADA) Act provides comprehensive civil rights protection for qualified individuals with disabilities. An individual with a disability is a person who: (1) has a physical impairment or a mental impairment that substantially limits a major life activity, (2) has a record of such impairment, or (3) is regarded as having such an impairment.

The ADA does not specifically name all of the impairments that are covered. If you have a disability, you have the right to inquire and receive information about testing accommodations.

"Testing Accommodation" means an adjustment to or modification of the standard testing conditions that eases the impact of the applicant's disability on the examination process without altering the nature of the exam.

As an applicant claiming a disability that requires testing accommodations, the applicant must properly complete the Special Testing Accommodation form. The burden of proof is on the applicant to establish the existence of a disability protected the Americans with Disabilities Act, as well as to establish the need for testing accommodations. Each application is evaluated on a case by case basis.

Qualified individuals with disabilities are required to request accommodations every time they plan to take the examination. It is in the candidate's best interests to provide recent and appropriate documentation, which clearly defines the extent and impact of the impairment(s) upon current levels of academic and physical functioning.

- Request for accommodations and appropriate supporting documentation, which when completed, should provide evidence of a substantial limitation to physical or academic functioning.
- Clinical evaluations and examinations of the candidate that have resulted in a diagnosis of a physical or mental impairment must have been performed by a licensed/certified or otherwise qualified professional with credentials appropriate to diagnose a candidate's disability consistent with the provisions of the ADA. Details about the professional's area of specialization and professional credentials must be provided.
- Documentation must be submitted on official letterhead from a licensed or qualified professional who examined the candidate and diagnosed a physical or mental impairment. Depending on the disability and written evaluation, documentation may include a letter from a physician or a detailed report.
- Document must be no more than 3 years old.
- Documentation for all disabilities should describe the extent of the disability and recommended accommodations.

A diagnosis of Attention Deficit Disorder (ADD) or Attention Deficit Hyperactivity Disorder (ADHD) must be supported by a current (administered within the past three years) comprehensive evaluation and relevant neuropsychological or psychoeducational assessment batteries. The report must include documented information that the patient meets criteria for long standing history, impairment, and pervasiveness. The report must include specific diagnosis of ADHD based on the DSM-IV diagnostic criteria.

- Candidate Application for Special Testing Accommodations
- Provider Application for Special Testing Accommodations
- Clinical evaluation on official letterhead (letter or detailed report)

If the links above do not work please navigate to *www.bpi.org* and select 'Applications' under the Documents tab at the top of the page

Please submit the forms at least 2 weeks in advance of your scheduled exam. Once these forms have been reviewed the applicant will receive notification of approval or denial from BPI. If approved you must bring the approval notice with you to the testing center.

Appendix D – Language Barrier Testing Accommodations

Language Barrier Testing Accommodations

If you have difficulty in comprehending the language of the test, you have the right to inquire in advance of testing whether any accommodations may be available to you. BPI shall allow the candidate, at his or her expense, to have an interpreter present at either a written or practical exam, provided that the interpreter is a bona fide interpreter that is engaged in that profession and that is pre-approved by BPI.

BPI Standard Testing Accommodations for candidates with a language barrier.

Written Examinations:
Exam times will be doubled.

Practical Examinations:
Exam times will be doubled.

- Candidate Application for Language Barrier Testing Accommodations

If the link above does not work, please navigate to *www.bpi.org* and select 'Applications' under the Documents tab at the top of the page

Please submit the form at least 2 weeks in advance of your scheduled exam.

Once these forms have been reviewed the applicant will receive notification of approval or denial from BPI. If approved, you must bring the approval notice with you to the testing center.

Terms and Definitions

Appeal – Request by applicant, candidate or certified person for reconsideration of any adverse decision made by the certification body related to her/his desired certification status.

Candidate – Applicant who has fulfilled specified prerequisites, allowing his/her participation in the certification process.

Certified Individual – An individual who successfully passes the BPI written and field exam requirements for certification.

Certification Process – All activities by which a certification body establishes that a person fulfills specified competence requirements, including application, evaluation, decision on certification, surveillance and recertification, use of certificates and logos/marks.

Certification Scheme – Specific certification requirements related to specified categories of persons to which the same particular standards and rules, and the same procedures apply.

Certification System – Set of procedures and resources for carrying out the certification process as per a certification scheme, leading to the issue of a certificate of competence, including maintenance.

Competence – Demonstrated ability to apply knowledge and/or skills and, where relevant, demonstrated personal attributes, as defined in the certification scheme.

Complaint – Conformity assessment request, other than an appeal, by any organization or individual to a certification body, for corrective action relating to the activities of that body or to those of any of its customers.

Evaluation – Process that assesses a person’s fulfillment of the requirements of the scheme, leading to a decision on certification.

Examination – Mechanism that is part of the evaluation, which measures a candidate's competence by one or more means such as written, oral, practical and observational.

Examiner – Person with relevant technical and personal qualifications, competent to conduct and/or score an exam.

Qualification – Demonstration of personal attributes, education, training and/or work experience.

Recertification – Process of confirming conformity with current certification requirements.

Scheme Committee – Group of people chosen by the certification body to provide input, recommendations, guidance and review of a certification scheme.

Surveillance – Periodic monitoring during the period of certification of a certified person's performance to ensure continued compliance with the certification scheme

NATIONAL HEALTHY HOMES
TRAINING CENTER™
& NETWORK

Healthy Housing
Solutions Inc.

HEALTHY HOME EVALUATOR

Funding for the development of this course was provided by the U.S. Department of Housing and Urban Development, Office of Lead Hazard Control and Healthy Housing.

Healthy Housing
Solutions Inc.

Overview and Introductions

Course Logistics

TRAINING CENTER

making homes healthier

About your Trainer…

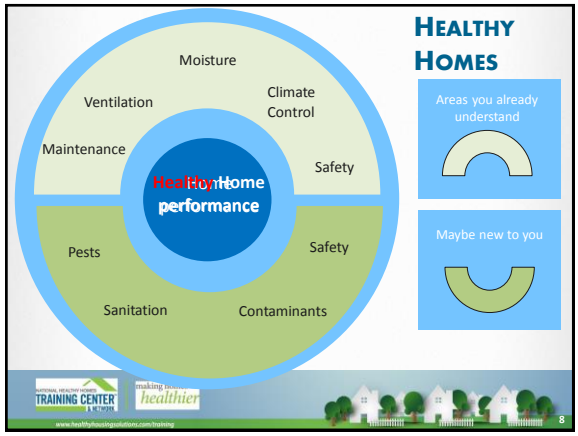
About you…

- Name
- Organization / Company
- Currently located
- Healthy housing or indoor air quality experience

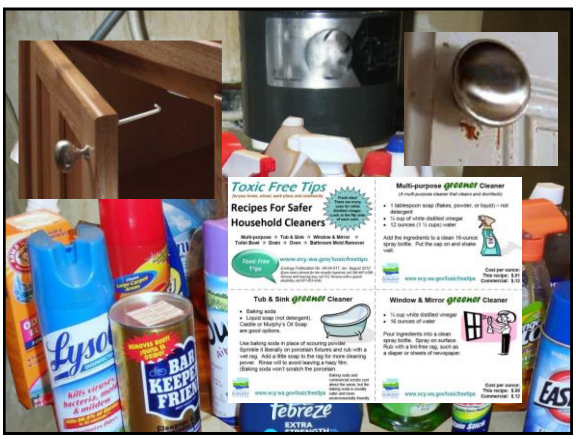
THE BIGGER PICTURE

This is the story of Grandma's house . . .

And this is the story of how mold triggered Grandma's and Red's asthma symptoms . . .

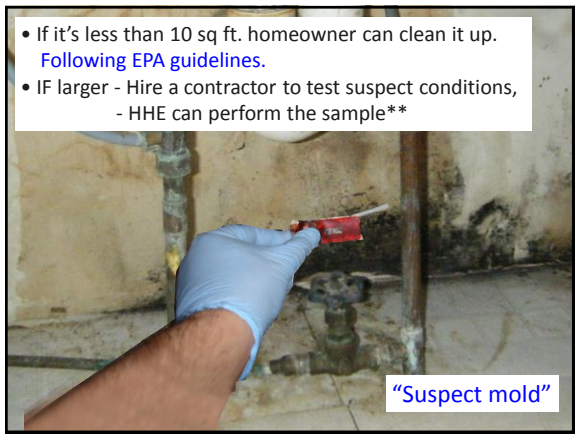

Healthy Homes
Moisture
Ventilation
Climate Control
Maintenance
Safety
Home performance
Pests
Safety
Sanitation
Contaminants
Areas you already understand
Maybe new to you
TRAINING CENTER
making homes healthier
8

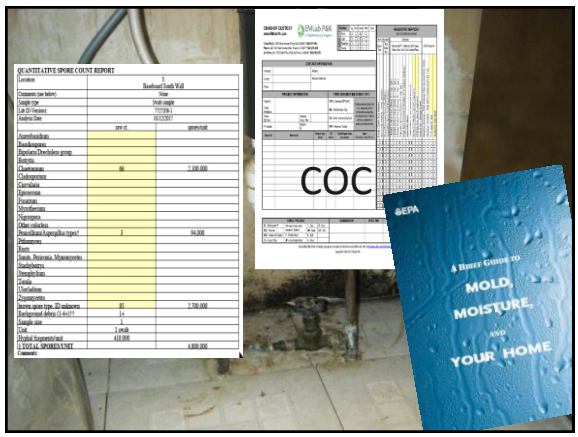

New Focus – Vision Test
TRAINING CENTER
making homes healthier
9


Toxic Free Tips
Recipes For Safer Household Cleaners
Multi-purpose ☆ Tub & Sink ☆ Window & Mirror ☆ Toilet Bowl ☆ Drain ☆ Oven ☆ Bathroom Mold Remover
www.ecy.wa.gov/toxicfreetips
Multi-purpose greener Cleaner
• 1 tablespoon soap (flakes, powder, or liquid) – not detergent
• ½ cup of white distilled vinegar
• 12 ounces (1 ½ cups) water
Add the ingredients to a clean 16-ounce spray bottle. Put the cap on and shake well.
www.ecy.wa.gov/toxicfreetips
Cost per ounce:
This recipe: $.01
Commercial: $.12
Tub & Sink greener Cleaner
• Baking soda
• Liquid soap (not detergent). Castile or Murphy's Oil Soap are good options.
Use baking soda in place of scouring powder. Sprinkle it liberally on porcelain fixtures and rub with a wet rag. Add a little soap to the rag for more cleaning power. Rinse well to avoid leaving a hazy film. (Baking soda won't scratch the porcelain.
www.ecy.wa.gov/toxicfreetips
Window & Mirror greener Cleaner
• ¼ cup white distilled vinegar
• 16 ounces of water
Pour ingredients into a clean spray bottle. Spray on surface. Rub with a lint-free rag, such as a diaper or sheets of newspaper.
www.ecy.wa.gov/toxicfreetips
Cost per ounce:
Commercial: $.12
febreze
EXTRA


Lysol
febreze
EXTRA
DAWN


Moisture mappir
Determine – it's dry and no significant damage to drywall or floor


• If it's less than 10 sq ft. homeowner can clean it up.
Following EPA guidelines.
• IF larger - Hire a contractor to test suspect conditions,
- HHE can perform the sample**
"Suspect mold"


QUANTITATIVE SPORE COUNT REPORT
COC
EPA
A Brief Guide to
MOLD,
MOISTURE,
AND
YOUR HOME


Safe
Maintained
Pests free
Dry
Clean
Contaminate free

At the end of this course, you are be able to:

1. **Apply good practices in working with residents**
2. Identify health-related hazards in a home
3. Prioritizing hazards
4. Use tools to measure conditions
5. Identify and communicate solutions

20

How you will learn in this course

21

Why Do a Healthy Homes Evaluation?

What motivates you to do this?

22

Housing Hazards = Health Problems

For example:

- More than 30 million homes have hazards that can result in health problems,
- More than 20 million housing units have a lead-based paint hazard, and
- More than 6.8 million homes have radon exposures above the EPA recommended action level.

Washington Post article 4/2013

Health Problems = Human Suffering

Healthcare Costs and Housing Hazards

- $1.4 billion cost for preventable hospitalizations for asthma in 2004.
- Injuries occurring at home result in 4 million ED visits and 70,000 hospital admissions.
- Preventing lead exposure among children saves $110 to $319 billion dollars annually.

One study found that the per visit cost for patients with asthma who were admitted to the hospital was nearly **$6,000**.

Health insurers are starting to realize the scope of these costs . . .

Healthy Homes Evaluation as a Service

How do you plan to offer healthy homes evaluations as a service?

What are your intentions?

More important that we understand and agree on the **intent** of an activity than that we always agree on the **terminology**.

It's all about 3 things:

- People
- Buildings
- Identifying hazards

Terminology Related to People:

- Resident
- Occupant
- Owner / Renter
- Client

- Interview
- Assessment
- Evaluation

Others?

What's going on with the person?

Terminology Related to Buildings:

- Building
- Home
- Healthy
- Environmental
- IAQ
- Dwelling

- Inspection
- Assessment
- Tools
- Testing
- Review
- Evaluation

What's going on with the building?

29

Terminology Related to Identifying Hazards:

- Issues
- Defects
- Concerns
- Conditions
- Hazards
- Exposure

- _____
- _____
- _____
- _____
- _____
- _____

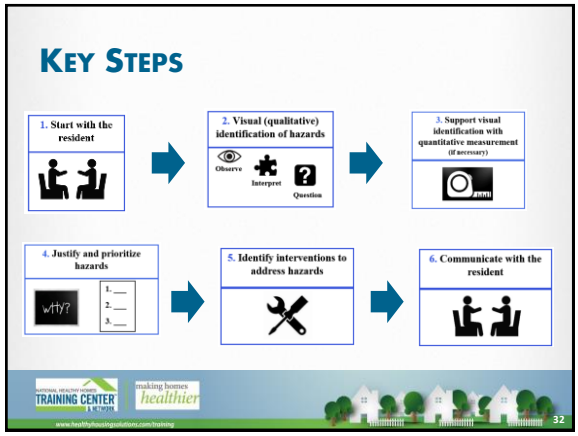
What are the hazards in the house?

30

KEY STEPS

Key Steps in a Healthy Home Evaluation

31


KEY STEPS
1. Start with the resident
2. Visual (qualitative) identification of hazards
Observe
Interpret
Question
3. Support visual identification with quantitative measurement
(if necessary)
4. Justify and prioritize hazards
why?
1. ___
2. ___
3. ___
5. Identify interventions to address hazards
6. Communicate with the resident
TRAINING CENTER
making homes healthier
32

A Tale of Weatherization and Healthy Homes

Anna Lopez (Grandma) lives in a single family house in a mostly rural area. Her 8 year old granddaughter, Maria, who is nicknamed Red, visits her as much as possible.

Sometime after a contractor insulates the attic to make the house more energy efficient and the water stain appears on the attic ceiling, both Grandma and Red find that they are coughing a bit. Grandma complains to her doctor about the coughing and her doctor suggests that she is suffering from seasonal allergies that can be treated with over-the-counter allergy medicine.

After the contractor air seals the attic to fix the moisture that is condensing underneath the roof, Grandma notices the condensation in the window and “suspect mold“ spots on the walls near the window. A few weeks after the “mold like substance” begins to grow, Red visits. Grandma and Red spend most of the day indoors baking cookies, but

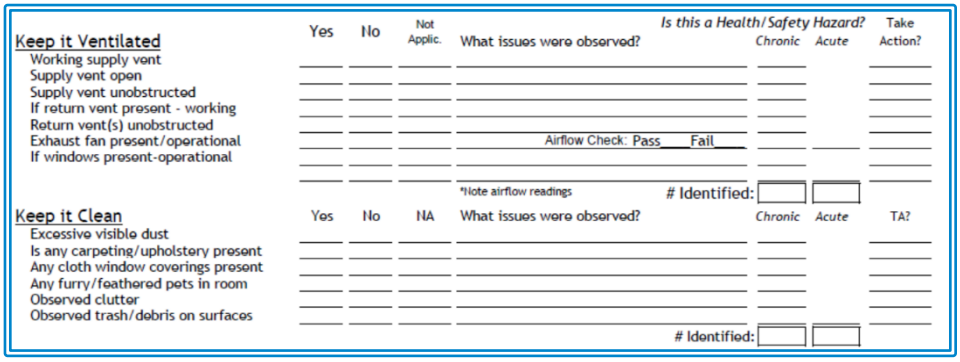
stop when Red starts to cough and wheeze. Red says she's having a hard time breathing.

Grandma takes Red to the Emergency Room and meets Red's mom there. The doctor examines Red and asks about her symptoms, including if they have occurred any other times, whether there was anything that seemed to trigger them, and whether Red is allergic to anything. Grandma and Red's mom tell the doctor that other than a coughing spell at Grandma's house one time, they haven't noticed any other symptoms and are not sure what may have triggered the episodes. Red's mom says she doesn't think Red is allergic to anything but she's never had her tested.

The doctor refers Red to an asthma and allergy specialist to be tested – and suggests that Grandma have her house evaluated to see if there are any environmental triggers that might be causing Red to react. Grandma thinks that is an excellent idea and when she goes home, she googles "healthy home evaluator" to find someone to evaluate her house. Her search comes up with Jacob

Grim, a BPI certified Healthy Home Evaluator.

After talking with Grandma on the phone about the work that's been done on her house and Red's symptoms, Mr. Grim hypothesizes that there may be environmental triggers for asthma and allergies in Grandma's house. Soon after, Mr. Grim comes to visit Grandma's house and sits down with her to ask her about her concerns. She tells him more about the problems she's having with the contractor making her home energy efficient and also mentions the health problems that Red has been having.



Keep it Ventilated	Yes	No	Not Applic.	What issues were observed?	Is this a Health/Safety Hazard? Chronic	Acute	Take Action?
Working supply vent							
Supply vent open							
Supply vent unobstructed							
If return vent present - working							
Return vent(s) unobstructed							
Exhaust fan present/operational				Airflow Check: Pass___ Fail___			
If windows present-operational							
				*Note airflow readings	# Identified:		

Keep it Clean	Yes	No	NA	What issues were observed?	Chronic	Acute	TA?
Excessive visible dust							
Is any carpeting/upholstery present							
Any cloth window coverings present							
Any furry/feathered pets in room							
Observed clutter							
Observed trash/debris on surfaces							
					# Identified:		

After a thorough visual evaluation of her house, Mr. Grim reports to Grandma that the suspect mold he's found in her living room is a possible hazard. He explains, according to the EPA, asthma and allergies can be triggered by a variety of indoor environmental hazards, including mold. Grandma notes that Red is going to an asthma and allergy specialist to be tested. Mr. Grim agrees with that as a good step to take, but he also recommends addressing the ventilation problem that is contributing to the moisture and potential mold problem that Grandma is having.

He and Grandma talk to the contractor who has been working on her house and ask the contractor to install a fan in her kitchen that vents to the outdoors. As a knowledgeable Healthy Homes Evaluator, Mr. Grim knows that he has to make sure that there is adequate make up air for the kitchen or the stove in her house won't draft properly. He also asks the contractor to install an outside air supply directly to the stove. After the installation, Mr. Grim conducts testing to make sure that the ventilation meets ASHRAE standard 62.2.

The spots were tested and verified to be mold. The HHE also suggests that Grandma contact a professional mold remediation specialist to come in and clean up the mold. Grandma agrees, and checks out several possible companies. She talks to past customers and makes sure that the company's technicians are certified/licensed Mold Removal Specialists. She choose the company who provides her with an affordable quote and the company comes in and cleans up all of the mold. The company tests Grandma's house to confirm that the mold is gone. Then the moisture issues are also corrected .

And Grandma and Red lived happily ever after . . . .

Vision Exercise - Kitchen

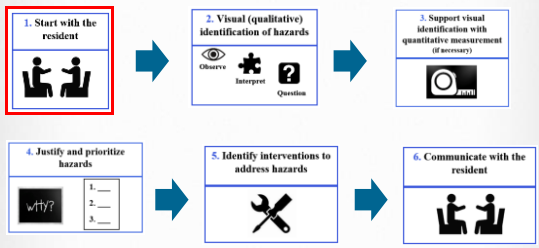
Typical assessment

HHE assessment

Module 2
Step 1: Start with the Resident

Healthy Housing Solutions Inc.

Key Steps



TRAINING CENTER | making homes healthier

2

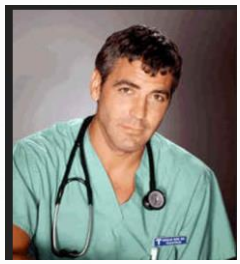
1. Start with the Resident

- Sample interview tools
- Communicating with the resident
- Impacts of health hazards on the resident.
- Case study (part 1)

TRAINING CENTER | making homes healthier

3

1. Start with the Resident



Not a doctor . . . . .

1. Start with the Resident

"If you get rid of the dust mites in your home, your daughter's asthma symptoms will decrease."

"There is evidence from the EPA that dust mites are an asthma trigger. I will explain some ways you can decrease dust mites in your house.
Make sure you consult a doctor about whether your daughter's asthma is related to dust mites."

Which one should you use?

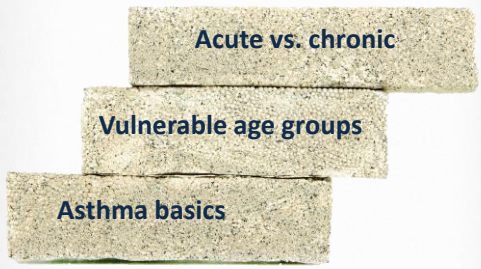
1. Start with the Resident

Health impacts of housing hazards in eight categories:

1. Moisture
2. Sanitation
3. Pests
4. Ventilation
5. Safety
6. Contaminants
7. Maintenance
8. Comfort

- 1. Dry
- 2. Clean
- 3. Pest-Free
- 4. Ventilated
- 5. Safe
- 6. Contaminant-Free
- 7. Maintained
- 8. Climate Controlled

Before We Get into the Principles . . .



Acute vs. Chronic

Acute: hazards that require immediate attention because they are an immediate threat to health or life.

Chronic – hazards which do not pose an immediate risk to health or life but do promote allergies, asthma, lead poisoning, pesticide exposure, or other chronic health conditions.

Vulnerable Age Groups – Safety Example

Age Group	Susceptibility
Infants	Choking/suffocation is the highest rate of injury death
Birth – age 14	Nonfatal falls at home
1-14 years old	Highest rate of home injury death is fires and burns
Older adults	Nonfatal falls at home
Adults 80+ years	20 times higher risk for death from injury than younger individuals

Identifying Vulnerable age groups

As a starting point – see the Healthy Homes Rating System Operating Guidance at:

https://portal.hud.gov/hudportal/documents/huddoc?id=operatingguidanceHHRS_1-14.pdf

Example on page 38, HHRS Operating Guidance

1 Damp and mould growth

Description of the hazard

1.01 This category covers threats to health associated with increased prevalence of house dust mites and mould or fungal growths resulting from dampness and/or high humidities. It includes threats to mental health and social well-being which may be caused by living with the presence of damp, damp staining and/or mould growth.

Potential for harm

Most vulnerable age group and statistical averages

1.02 The most vulnerable age group is all persons aged 14 years or under.

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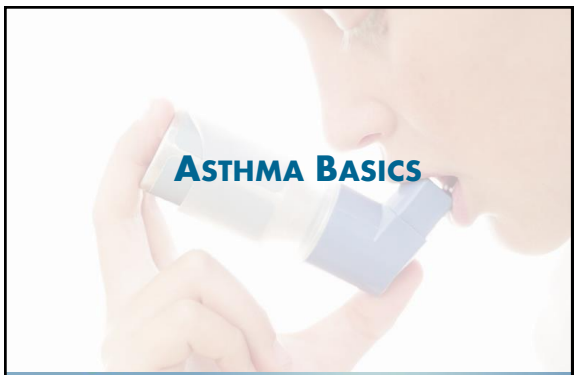
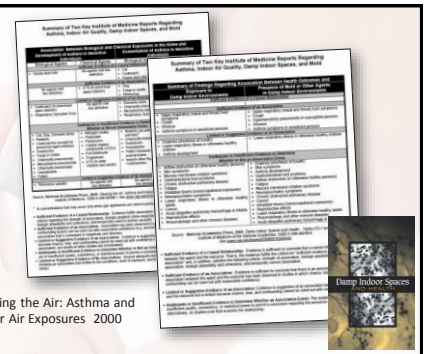
Asthma Basics



11

Institute of Medicine



Clearing the Air: Asthma and Indoor Air Exposures 2000

Damp Indoor Spaces and Health 2004

National Healthy Homes Training Center and Network

Healthy Housing Solutions, INC
www.healthyhousingsolutions.com

Asthma Symptoms vs. Development of asthma

- Asthma symptoms means an attack has been triggered and the individual is coughing, wheezing, or having shortness of breath.
- Developing asthma means a doctor has diagnosed an individual as having asthma.

Types of Asthma

An important note about asthma:

- 60% of people with asthma have allergic asthma
- Triggers for those with allergic asthma include:
  - Cockroaches
  - Dust mites
  - Molds
  - Pet dander
  - Pollen
  - Secondhand smoke

American Academy of Allergy Asthma And Immunology

Health Impacts of Hazards

By principle:

1. Dry
2. Clean
3. Pest-Free
4. Ventilated
5. Safe
6. Contaminant-Free
7. Maintained
8. Climate Controlled

HEALTH IMPACTS:

moisture and microbial conditions such as mold impact the lungs through:

1. **Asthma**
2. **Infections**
   - Bronchitis
   - Fungal infections
3. **Allergies**

Keep it Dry

HEALTH IMPACTS: asthma/allergy triggers

Strong evidence that chronic exposure to indoor dampness and microbial agents (e.g. mold) is associated with the development of asthma in sensitized individuals.

More on Mold

Keep it Dry

SANITATION – CLEANING REDUCES EXPOSURE TO:

Particulates from cooking, fireplaces, and cigarette smoking

Asthma and allergy triggers such as mold and pests

Pesticides

Dust

Keep it Clean

HEALTH IMPACT:

Environmental Tobacco Smoke (ETS):

Sudden Infant Death Syndrome (SIDS)

Coronary heart disease

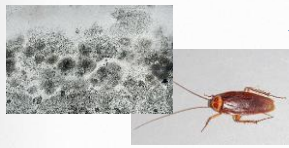
Ear problems

- Acute respiratory infections,
- More severe asthma,
- Lung cancer,
- Chronic Obstructive Pulmonary Disease,
- Pneumonia, and
- Bronchitis

Second hand and Third hand smoke

Keep it Clean

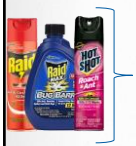
HEALTH IMPACTS: asthma/allergy triggers



- Respiratory disease
- Allergy / Asthma trigger
- Asthma symptoms
- Development of asthma

Keep it Clean

HEALTH IMPACTS: pesticide poisoning



Headache

Nausea or loss of appetite

Moodiness, restlessness, mental confusion

Skin, eye, nose and throat irritation

Difficulty breathing

Severe poisoning can include vomiting, uncontrollable muscle twitches, convulsions inability to breathe and unconsciousness.

Keep it Clean

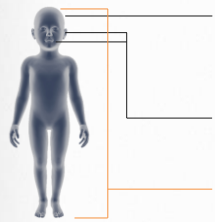
Acute vs. Chronic pesticide poisoning

Acute – occurs after exposure to a single dose of pesticide

Chronic – occurs from repeated, small, non-lethal doses over a long period of time.

Keep it Clean

Health Impacts: Lead Exposure



- Reduced IQ,
- Reduced attention span,
- Increased antisocial behavior and
- Reduced educational attainment

- Damaged hearing and speech

- Slowed growth
- Anemia (too few red blood cells)
- Feels tired or weak
- Shortness of breath,
- Dizziness or headaches

Keep it Maintained

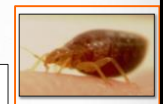
Health Impacts: Pests

Asthma Triggers AND Allergy Triggers

Dust mites
- Asthma trigger
- Allergy trigger

Cockroaches
- AND carry bacteria, viruses.

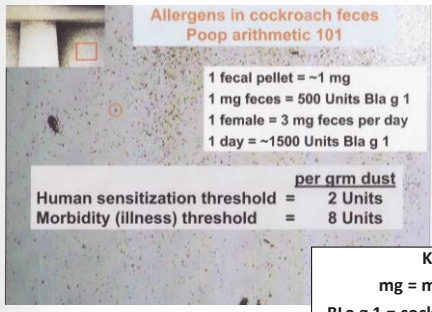
Mice (and rats)
- AND carry bacteria, viruses, salmonella and hantavirus



Bedbugs
- Disturb sleep and mental health

Keep it Pest-free

HEALTH IMPACTS: Pests



Allergens in cockroach feces
Poop arithmetic 101

1 fecal pellet = ~1 mg
1 mg feces = 500 Units Bla g 1
1 female = 3 mg feces per day
1 day = ~1500 Units Bla g 1

	per grm dust
Human sensitization threshold =	2 Units
Morbidity (illness) threshold =	8 Units

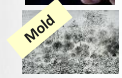
KEY
mg = milligram
BLa g 1 = cockroach allergen

Health impacts: VENTILATION problems:

- Various pollutants can be found in concentrations 2-5 times higher indoors than outdoors.

Keep it Ventilated

Pollutants covered under previous "Keep it" Principles:



Do you remember the health impacts from these hazards?

Keep it Ventilated

Other pollutants that can be concentrated indoors without proper ventilation:

Volatile Organic Compounds (VOCs)

Chemical compounds that evaporate when exposed to the air.

- Eye, nose and throat irritation
- Headaches
- Loss of coordination

- Damage to liver, kidneys and central nervous system
- Risk of cancer

Keep it Ventilated

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GIZMODO http://gizmodo.com/5896801/what-exactly-is-that-new-car-smell

What Exactly *Is* That New Car Smell?

Rachel Swaby

The smell of a new car is intoxicating. It reminds us of money and shiny objects. It evokes that golden period before repeat coffee stains, moldy Tupperware, and our trunk's transformation into a Good Will depository change the way we feel about our car. But it's kind of a weird smell, right? It's so different from chocolate chip cookies or eucalyptus or whatever else we identify as pleasant.

Unfortunately, . . . The smell is mostly organic compounds in the vehicle off-gassing. Anything that is vinyl or plastic—the foam lamination on the seat surface, the plastic on the dash or on the door panel—it's the VOCs coming out of them that causes that smell. VOCs . . . can do a number on your health. And they're everywhere. Thousands of household products-from paints to cleaning products to waxes-all emit the gasses . . .

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Other pollutants that can be concentrated indoors without proper ventilation: Particulate Matter

Keep it Ventilated

What is it?	A mixture of solid particles and liquid droplets found in the air.
Sources?	Dust, dirt, soot, and smoke sources, chemical reactions from industry
Health impacts?	Exacerbate heart and lung disease, aggravate asthma, decrease lung function, increase respiratory symptoms

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Health impacts: Safety problems include a variety of injuries, including:

- Choking and suffocation
- Drowning
- Electrical shock
- Entry by intruders
- Fires and burns
- Firearms related injuries
- Poisoning
- Trips and falls

Keep it Safe

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Health impacts: CONTAMINANT problems:

Four specific contaminants to focus on.
Two have been reviewed already.

Do you remember the health impacts from these hazards?

Keep it Contaminant-free

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Health impacts from CONTAMINANT problems -- Asbestos:

	What is it?	Sources?	Health impacts?
Asbestos 	Naturally occurring fibrous mineral	Roofing shingles, 9 inch floor tiles, insulation	Lung cancer, mesothelioma, asbestosis

Keep it Contaminant-free

35

Health impacts: Contaminant -- Asbestos:

Mesothelioma: (*mess-o-theel-e-oma*)

A cancer of the lining of the chest and the abdominal cavity

Asbestosis: (*as-be-**stoh**-sis*)

Lungs become scarred with fibrous tissue, leading to shortness of breath and persistent cough

Keep it Contaminant-free

Health impacts: Contaminant -- Radon:

What is it?

Naturally occurring radioactive gas that comes from the breakdown of uranium in soil, rock and water and gets into the air you breathe.

Sources?

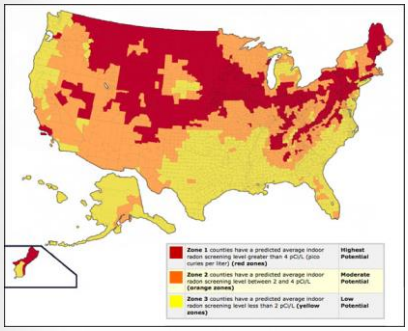
Radon comes from the soil. It can also enter the home through well water.

Health impacts?

Lung cancer

Number 2 cause of lung cancer after smoking tobacco

Keep it Contaminant-free



Health impacts: Maintenance problem -- lead-based paint

Do you remember the health impacts?

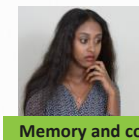
- Reduced IQ,
- Reduced attention span,
- Increased antisocial behavior and
- Reduced educational attainment
- Damaged hearing and speech
- Slowed growth
- Anemia (too few red blood cells)
- Feels tired or weak
- Shortness of breath,
- Dizziness or headaches

Keep it Maintained

Health impacts: Lead-based paint on adults:

Muscle and joint pain

High blood pressure



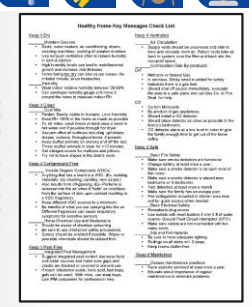
Fertility and sexual problems

Memory and concentration problems

Keep it Maintained

Essentials Manual

Resources



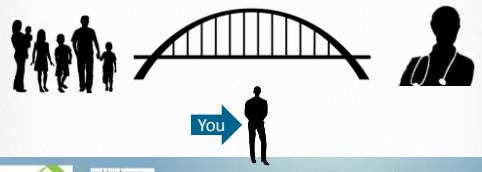
Separate sheet in your binder

And in the Essentials Manual

Essentials Manual

Now that you know all this health impacts information . . .

Remember that you can be a bridge between your client and a health professional BUT you are NOT a health professional yourself.



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Review of health Impacts

Get ready to compete!

1. Close your binders.
2. Your instructor will divide the class into two teams.
3. Your instructor will show a question on the screen and ask Team A to answer it.
   - Team A must agree on the answer(s) to the question.
   - If Team A gets the question right, they get one point.
   - If they get the question wrong, Team B gets a chance to answer the question (and get the point)
4. Your instructor will alternate questions between Team A and Team B.
5. The Team with the most points at the end of the game, wins!

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QUICK REVIEW ON RESIDENT INTERVIEWING

44

Sample Interview Tools

- Pediatric Environmental Home Assessment (PEHA)
- Interview tools from local / state governments
- ASTM D7297 – Evaluating Residential IAQ Concerns
- Lawrence Berkley Laboratories questionnaire (in development)
- NEEF Environmental Health Survey
- Healthy Homes Inspection Manual (Section 1)

Practice Interview

- Break into groups of 3
- Find the PEHA Resident Information form
- Interview your partner (5 minutes)
  - Third person is an observer
- Use your own home as a reference to answer questions

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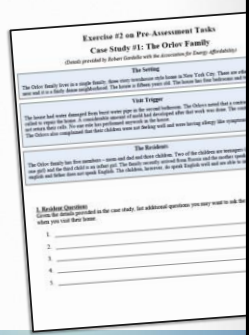
The Orlov Family Case Study (Part 1)

- Same groups
- Take out Orlov Case Study
- Read the case study
- Write out questions for the residents.
- Report out to full class


Exercise #2 on Pre-Assessment Tasks

Case Study #1: The Orlov Family

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Summary of Two Key Institute of Medicine Reports Regarding Asthma, Indoor Air Quality, Damp Indoor Spaces, and Mold

Association Between Biological and Chemical Exposures in the Home and			
Development of Asthma in Sensitive Individuals		**Exacerbation of Asthma in Sensitive Individuals**	
Biological Agents	**Chemical Agents**	**Biological Agents**	**Chemical Agents**
Sufficient Evidence of a Causal Relationship			
• House dust mite	*No agents met this definition*	• Cat • Cockroach • House dust mite	• ETS (in preschool-aged children)
Sufficient Evidence of an Association			
No agents met this definition	• ETS (in preschool-aged children)	• Dog • Fungi or molds • Rhinovirus	• Nitrogen oxides (high-level exposures)[1]
Limited or Suggestive Evidence of an Association			
• Cockroach (in preschool-aged children) • Respiratory Syncytial Virus	*No agents met this definition*	• Domestic birds • *Chlamydia pneumoniae* • *Mycoplasma pneumoniae* • Respiratory Syncytial Virus	• ETS (in school aged and older children, & adults) • Formaldehyde • Fragrances
Inadequate or Insufficient Evidence to Determine Whether or Not an Association Exists			
• Cat, Dog, Domestic Birds • Rodents • Cockroaches (except for preschool-aged children) • Endotoxins • Fungi or molds • *Chlamydia pneumoniae* • *Mycoplasma pneumoniae* • *Chlamydia trachomatis* • Houseplants • Pollen	• Nitrogen oxides • Pesticides • Plasticizers • Volatile organic compounds (VOCs) • Formaldehyde • Fragrances • ETS (in older children and adults)	• Rodents (as pets or feral animals)[2] • *Chlamydia trachomatis* • Endotoxins • Houseplants • Pollen exposure in indoor environments • Insects other than Cockroaches	• Pesticides • Plasticizers • Volatile organic compounds (VOCs)
Limited or Suggestive Evidence of No Association			
• Rhinovirus (adults)	*No agents met this definition*	*No agents met this definition*	*No agents met this definition*

Source: ***National Academies Press, 2000****. Clearing the Air: Asthma and Indoor Air Exposures. Executive Summary Institute of Medicine. ISBN 0-309-06496-1 See www.nap.edu/books/0309064961/html/.*

[1] At concentrations that may occur only when gas appliances are used in poorly ventilated kitchens.

- **Sufficient Evidence of a Causal Relationship:** Evidence fulfills association criteria and in addition satisfies criteria regarding the strength of association, biologic gradient (dose-response effect), consistency of association, biologic plausibility and coherence, and temporality used to assess causality.
- **Sufficient Evidence of an Association:** Association has been observed in studies in which chance, bias, and confounding factors can be ruled out with reasonable confidence (e.g. several small bias free studies showing an association that is consistent in magnitude and direction
- **Limited or Suggestive Evidence of an Association:** Evidence is suggestive of an association but is limited because chance, bias, and confounding cannot be ruled out with confidence (e.g. one high quality study shows association, but results of other studies are inconsistent)
- **Inadequate or Insufficient Evidence to Determine Whether or Not an Association Exists:** Available studies are of insufficient quality, consistency, or statistical power to permit a conclusion; or no studies exist
- **Limited or Suggestive Evidence of No Association:** Several adequate studies are mutually consistent in not showing an association (but limited to the conditions, level of exposure, and length of observation covered in the study).

Summary of Two Key Institute of Medicine Reports Regarding Asthma, Indoor Air Quality, Damp Indoor Spaces, and Mold

Summary of Findings Regarding Association Between Health Outcomes and	
Exposure to Damp Indoor Environments	**Presence of Mold or Other Agents in Damp Indoor Environments**
Sufficient Evidence of a Causal Relationship	
Sufficient Evidence of an Association	
• Upper respiratory (nasal and throat) tract symptoms • Cough • Wheeze • Asthma symptoms in sensitized persons	• Upper respiratory (nasal and throat) tract symptoms • Cough • Hypersensitivity pneumonitis in susceptible persons • Wheeze • Asthma symptoms in sensitized persons
Limited or Suggestive Evidence of an Association	
• Dyspnea (shortness of breath) • Lower respiratory illness in otherwise healthy children • Asthma development	• Lower respiratory illness in otherwise healthy children
Inadequate or Insufficient Evidence to Determine Whether or Not an Association Exists	
• Airflow obstruction (in otherwise healthy persons) • Skin symptoms • Mucous membrane irritation syndrome • Gastrointestinal tract problems • Chronic obstructive pulmonary disease • Fatigue • Inhalation fevers (nonoccupational exposures) • Neuropsychiatric symptoms • Lower respiratory illness in otherwise healthy adults • Cancer • Acute idiopathic pulmonary hemorrhage in infants • Reproductive effects • Rheumatologic and other immune diseases	• Dyspnea (shortness of breath) • Skin symptoms • Asthma development • Gastrointestinal tract problems • Airflow obstruction (in otherwise healthy persons) • Fatigue • Mucous membrane irritation syndrome • Neuropsychiatric symptoms • Chronic obstructive pulmonary disease • Cancer • Inhalation fevers (nonoccupational exposures) • Reproductive effects • Lower respiratory illness in otherwise healthy adults • Rheumatologic and other immune diseases • Acute idiopathic pulmonary hemorrhage in infants

Source: ***National Academies Press, 2004****. Damp Indoor Spaces and Health. Tables ES-1 and ES-2 Institute of Medicine of the National Academies, ISBN 0-309-09246-9. See www.nap.edu/books/0309091934/html/.*

- **Sufficient Evidence of a Causal Relationship:** Evidence is sufficient to conclude that a causal relationship exists between the agent and the outcome. That is, the evidence fulfills the criteria for "sufficient evidence of an association" and, in addition, satisfies the following criteria: strength of association, biologic gradient, consistency of association, biologic plausibility and coherence, and temporally correct association.

- **Sufficient Evidence of an Association:** Evidence is sufficient to conclude that there is an association. That is, an association between the agent and the outcome has been observed in studies in which chance, bias, and confounding can be ruled out with reasonable confidence.

- **Limited or Suggestive Evidence of an Association:** Evidence is suggestive of an association between the agent and the outcome but is limited because chance, bias, and confounding cannot be ruled out with confidence.

- **Inadequate or Insufficient Evidence to Determine Whether an Association Exists:** The available studies are of insufficient quality, consistency, or statistical power to permit a conclusion regarding the presence of an association. Alternatively, no studies exist that examine the relationship.

Pediatric Environmental Home Assessment

Last Revised October 2009

RESIDENT REPORTED INFORMATION

Bolded *responses indicate areas of greater concern.*

General Housing Characteristics					
Type of ownership		❑ Own house	❑ Market rate rental hsg.	❑ Subsidized rental hsg.	❑ Shelter
Age of home		**❑ Pre-1950**	**❑ 1950 - 1978**	❑ Post-1978	**❑ Don't know**
Structural foundation		❑ Basement	❑ Slab on grade	❑ Crawlspace	❑ Don't know
Floors lived in (check all that apply)		❑ Basement	❑ 1st	❑ 2nd	❑ 3rd or higher
Heating	**Fuel used**	❑ Natural gas	❑ Oil	❑ Electric	❑ Wood
	Sources in home	❑ Baseboards	❑ Radiators	❑ Forced hot air vents	**❑ Other:** _____
	Filters changed	❑ Yes	**❑ No**	❑ HEPA air filter	**❑ Don't know**
	Control	❑ Easy to control heat	❑ Hard to control heat		
Cooling		❑ Windows	❑ Central/window AC	❑ Fans	❑ None
Ventilation (check all that apply)		❑ Open windows	❑ Kitchen & bathroom fans	❑ Central ventilation	

Indoor Pollutants					
Mold and moisture		❑ Uses dehumidifier ❑ No damage	**❑ Uses vaporizer or humidifier**	**❑ Musty odor evident**	**❑ Visible water / mold damage**
Pet	**Presence**	❑ No pets	**❑ Cat #**_____	**❑ Dog #**_____	❑ Other: _____
	Management	❑ Kept strictly outdoors	❑ Not allowed in patient's bedroom	**❑ Full access in home**	❑ Sleeping location: _____
Pests	**Cockroaches**	❑ None	**❑ Family reports**	**❑ Family shows evidence**	Present in ❑ kitchen ❑ bedroom ❑ other
	Mice	❑ None	**❑ Family reports**	**❑ Family shows evidence**	Present in ❑ kitchen ❑ bedroom ❑ other
	Rats	❑ None	**❑ Family reports**	**❑ Family shows evidence**	Present in ❑ kitchen ❑ bedroom ❑ other
	Bedbugs	❑ None	**❑ Family reports**	**❑ Family shows evidence**	Present in ❑ bedroom ❑ other
Lead paint hazards		❑ Tested and passed	❑ Tested, failed, and mitigated	**❑ Not tested/Don't know**	**❑ Loose, peeling, or chipping, paint**
Asbestos		❑ Tested – None present	❑ Tested, failed, and mitigated	**❑ Not tested/Don't know**	**❑ Damaged material**
Radon		❑ Tested and passed	❑ Tested, failed, and mitigated	**❑ Not tested/Don't know**	**❑ Failed test but not mitigated**
Health and Safety Alarms		❑ Smoke alarm working and well placed	❑ CO alarm working and one on each floor	**❑ CO alarm does not log peak level**	**❑ No smoke alarm** **❑ No CO alarm**
Tobacco smoke exposure		❑ No smoking allowed	❑ Smoking only allowed outdoors	**❑ Smoking allowed indoors** **❑ bedroom** **❑ playroom**	**❑ Total # smokers in household:** _____ **❑ Mother smokes**
Other irritants		❑ None	**❑ Air fresheners**	**❑ Potpourri, incense, candles**	**❑ Other strong odors:** _____
Type of cleaning		❑ Vacuum (non-HEPA)	❑ HEPA vacuum	❑ Damp mop and damp dusting	**❑ Sweep or dry mop**

NOTES:

NURSE OBSERVED INFORMATION
***Bolded** responses indicate areas of greater concern.*

Home Environment					
Drinking Water Source		❑ Public water system	❑ **Household Well**		
Kitchen	**Cleanliness**	❑ No soiling	❑ Trash or garbage sealed	❑ **Trash or garbage not sealed**	❑ **Wall/ceiling/floor damage**
	Ventilation	❑ Functioning stove exhaust fan/vent	❑ **Mold growth present**	❑ **Broken stove exhaust fan/vent**	❑ **No stove exhaust fan/vent**
Bathroom		❑ Functioning exhaust fan/vent/window	❑ **Mold growth present**	❑ **Needs cleaning and maintenance**	❑ **Wall/ceiling/floor damage**
Basement		❑ None/No Access	❑ **Mold growth present**	❑ **Needs cleaning and maintenance**	❑ **Wall/ceiling/floor damage**
Living Room		❑ No soiling	❑ **Mold growth present**	❑ **Needs cleaning and maintenance**	❑ **Wall/ceiling/floor damage**
Laundry area		❑ None	❑ Well maintained	❑ **Dryer not vented**	❑ Hang clothes to dry

Sleep Environment				
Patient's sleep area	❑ Own room	❑ Shared # in room_____	❑ Other	
# Beds	❑ 0	❑ 1	❑ 2	❑ More than 2
Allergen impermeable encasings on beds	❑ On mattress and boxspring (zippered)	❑ On mattress only (zippered)	❑ On mattress (not zippered)	❑ **No mattress covers**
Pillows	❑ Allergen-proof	❑ Washable	❑ Feather/ down	
Bedding	❑ Washable	❑ Wool/not washable	❑ Feather/ down	
Flooring	❑ Hardwood/Tile/Linoleum	❑ Small area rug	❑ Large area rug	❑ **Wall-to-wall carpet**
Dust/mold catchers	❑ Stuffed animals/washable toys ❑ No clutter	❑ **Non-washable toys**	❑ **Plants**	❑ **Other** _____
Window	❑ Washable shades/ curtains	❑ Washable blinds	❑ Curtains/ drapes	❑ **No window/ poor ventilation**
Other irritants	❑ **Abundant cosmetics and fragrances**			

Home Safety **** can indicate housing code violations***				
General				
Active renovation or remodeling	❑ **Yes**	❑ No		
***Stairs, protective walls, railings, porches**	❑ Yes	❑ **No**		
***Hallway lighting**	❑ Adequate	❑ **Inadequate**		
Poison control number	❑ Posted by phone	❑ **Not posted by phone**		
****Family fire escape plan**	❑ Developed and have copy available	❑ **None**		
Electrical appliances (radio, hair dryer, space heater)	❑ Not used near water	❑ **Used near water**		
Matches and lighters stored	❑ Out of child's reach	❑ **Within child's reach**		
Exterior environment	❑ Well maintained	❑ **Abundant trash and debris**	❑ **Chipping, peeling paint**	❑ **Broken window(s)**

NURSE OBSERVED INFORMATION (continued)

Home Safety **** can indicate housing code violations***			
Young Children Present	❑ Yes	❑ No	
Coffee, hot liquids, and foods	❑ Out of child's reach	❑ **Within child's reach**	
Cleaning supplies stored	❑ Out of child's reach	❑ **Within child's reach**	
Medicine and vitamins stored	❑ Out of child's reach	❑ **Within child's reach**	
Child (less than six years old) been tested for lead poisoning	❑ Within past 6 months Result: _____	❑ **Within past year or more.** **When? _____ Result: _____**	❑ **No**
Child watched by an adult while in the tub	❑ Always	❑ **Most of the time**	❑ **No**
***Home's hot water temperature**	❑ <120 F	❑ **>120 F**	❑ **Don't know**
Non-accordion toddler gates used	❑ At top of stairs	❑ **At bottom of stairs**	❑ **No**
Crib mattress	❑ Fits well	❑ **Loose**	❑ NA
Window guards	❑ Yes	❑ **No**	
Window blind cords	❑ Split cord	❑ **Looped cord**	

NOTES:

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National Center for Healthy Housing

10227 Wincopin Circle, Suite 200 • Columbia, MD 21044 • Tel. (410) 992-0712
www.centerforhealthyhousing.org

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N • E • E • T • F
The National Environmental Education & Training Foundation
We credit its *Environmental Management of Pediatric Asthma: Guidelines for Health Care Providers* and model Pediatric Environmental History Form

and

The Center for Healthy Homes and Neighborhoods at Boston University
We credit its model Pediatric Asthma-Allergy Home Assessment form

Case Study: The Orlov Family (part 1)

Pre-Assessment Tasks

The Setting

The Orlov family lives in a single family, three story townhouse style home in a large city. There are other houses near and it is a fairly dense neighborhood. The house is fifteen years old. The house has three bedrooms and 2 1/2 bathrooms.

Visit Trigger

The house had water damage from a burst water pipe in the kitchen. The Orlovs explained that a contractor was called to repair the damage. A considerable amount of mold had developed after that work was done. The contractor would not return their calls. No one else has performed any work in the house. The Orlovs also complained that their children and mother-in-law were not feeling well and were having "cold" like symptoms, (coughing sneezing and runny nose.)

The Residents

The Orlov family has six members – three children, mother and father and his mother. Two of the children are teenagers (boy and girl) and the third child is a toddler (girl). The family recently moved from a rural town. The mother-in-law speaks little English.

1. Resident Questions

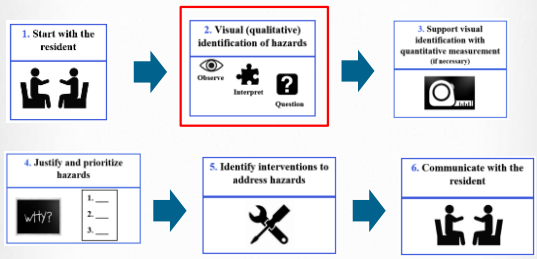
Given the details provided in the case study, list additional questions you may want to ask the Orlov family when you visit their home.

1. _____
2. _____
3. _____
4. _____
5. _____

Module 3
Step 2: Visual Identification of Hazards

Healthy Housing Solutions Inc.

Key Steps



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Module Topics

2. Visual (qualitative) identification of hazards

Observe | Interpret | Question

- Visual assessment tools
- Developing a hypothesis
- Risk assessment
- The assessment process
- Practice
- Extra focus on pests

STOP Who can list the eight Keep It principles?

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Remember the Eight Principles

1. Dry
2. Clean
3. Pest-Free
4. Ventilated
5. Safe
6. Contaminant-Free
7. Maintained
8. Climate Controlled

Visual Assessment Tools

Interview and Visual Assessment Tools

- Most interview tools have a visual assessment component.
- Bottom line is what works for you to do an assessment in a structured way.

Sample Checklists

- Allies Against Asthma
- ASTM D7297 IEQ Assessment
- CEHRC (available in the Essentials course materials)
- Children's Mercy Hospital Environmental Health Assessment form
- Environmental Protection Agency Home Visit
- Harvard School of Public Health
- U.S. Department of Housing & Urban Development Healthy Homes Rating System
- King County/Seattle
- Pediatric Environmental Home Assessment form

May be the same tool as the Interview tool in Step 1

8

Developing a Hypothesis

9

The Hypothesis

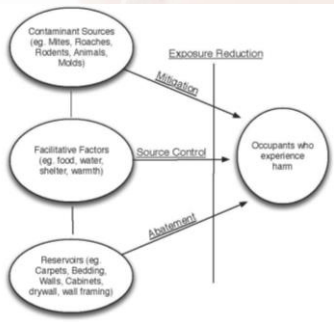
- Start with a hypothesis that covers the purpose of the assessment (not the complaint).
- A hypothesis is a testable statement.

Remember: only health providers can make health and environment connections.

10

Risk Assessment

Home Environmental Assessment Should Guide Exposure Reduction



Ciaccio, Christina E. MD, Kevin Kennedy, MPH, Jay M. Portnoy, MD, *A New Model for Environmental Assessment and Exposure Reduction* Current Allergy and Asthma Reports December 2012, Volume 12, Issue 6, pp 650-655

Assessments should:

- Identify the nature and extent of individual hazards: **Risk Assessment**
- Determine the relative risk of different hazards: **Risk Analysis**
- Evaluate the interactions and synergisms between individual hazards: **Risk characterization**

Source: HUD Healthy Homes Issues: Residential Assessments, March 2006

Risk Assessment

Risk Assessment is a systematic method of collecting and interpreting scientific information relating environmental hazards to human health.

Risk Assessment is a process of quantifying the likelihood of harmful effects from a hazard.

Risk assessment is NOT making medical statements or connections.

Risk Assessment in the Federal Government: Managing the Process", National Research Council, © 1983

Home Assessments are Risk Assessments

Risk Assessment Steps*

- Hazard Identification
- Hazard Evaluation
  - Consider dose-response
- Exposure Assessment
- Risk Characterization

**National Research Council, 1983*

Risk assessments include risk-benefit analysis with the goal:

to reduce exposure to hazard whenever possible

- Example: Avoid sun exposure

to accept substantial hazard only for great benefit

- Example: Flying versus driving

to accept minor hazard for modest benefit; and

- Example: Hair dying or coloring

to accept no hazard at all when the benefit seems relatively trivial

- Example: Tanning beds (is there a health risk?)

Philip Handler (1979), President of U.S. National Academy of Sciences 1969 to 1981

The Assessment Process

1 2 3

Observe, Interpret and Question

- **Observe, interpret and question steps** are a mini-sequence, within the evaluation.
- **First** - observe hazards and identify them.
- **Second** - interpret what you see.
- **Third** - follow up questions for the resident based on what you've observed.

- Water stain example, ask the resident **"Did this water stain appear recently or has it been there a while?**

More on Interpretation

- Interpretations are a combination of professional knowledge, experience and logic.
- Some interpretations may require research evidence to support conclusions.

What myths have you encountered?

What About Rental Property?

- Assessment allowed if non-destructive
- Family should provide report to Landlord
- Issues identified that are code violations may need to be reported to code enforcement.

Acute Hazards: (Review)

Hazards that require immediate attention due to the potential for posing an imminent danger to life and health.

Examples include:

- Physical: loose stairs, child access to crawl spaces, structural deterioration or significant damage etc.,
- Biological hazards: Sewer back ups on carpets where people are using the room, etc.,
- Chemical hazards: poisons, drugs, chemicals, lead paint/dust hazards, detectable carbon monoxide or gas leaks, etc.,

Chronic Hazards: (Review)

Hazards which do not pose an immediate danger to life and health but do promote allergies, asthma, lead poisoning, pesticide exposure, or other chronic health conditions.

Examples include:

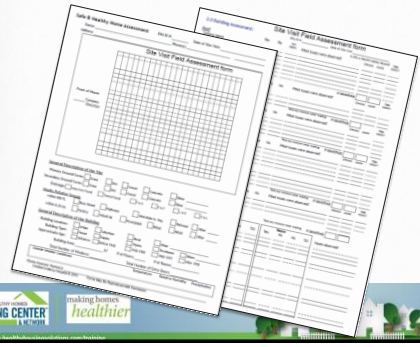
Physical: Poor HVAC maintenance, windows in disrepair, foundation cracks, minor roof damage, plumbing leaks

Biological: Observed/reported pests, condensation and microbial growth, open cracks/gaps in siding, wet/damp drywall

Chemical: poorly operating stove, lack of ventilation/ exhaust fans in bathrooms and over gas stoves

Refer to Site Visit forms

Same forms that will be used in the site visit.



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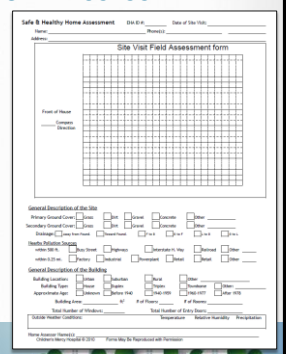
Qualitative or Visual Assessment

- Areas to Assess:
  - Exterior
  - Structural Components
  - Mechanical Components
  - Room by Room Visual Assessment
  - Floor Plan



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Home Assessment Process

Where should a home assessment start?

- Outside?
- Living Room?
- Basement?
- Child bedroom?

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Investigations are an Iterative Process

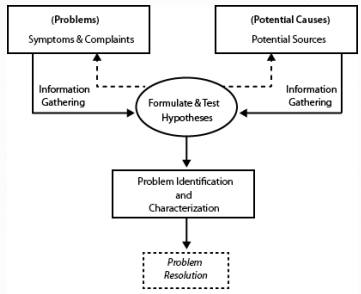

FIG. 1 Interactive Approach to Solving IAQ Problems

From: ASTM-7297-Indoor Air Quality Assessment, American Society of Testing and Measurement (ASTM)

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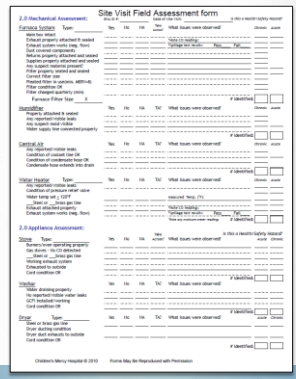
Visual Assessment

Mechanical Components:

- Furnace/AC
- Window AC
- Water Heater
- Main Plumbing
- Kitchen Plumbing
- Bathroom Plumbing



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Practice

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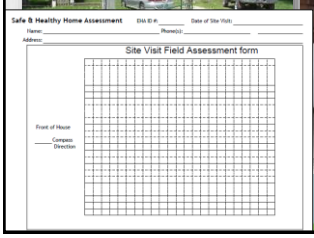
Site & Building Assessment

Photos presented here courtesy of the Center for Environmental Health, Children's Mercy Hospital, © 2010.

What are we looking for ?

What are we asking ?



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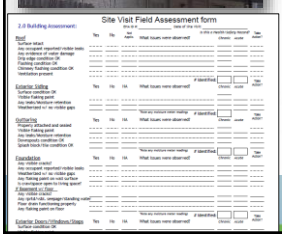
Building Assessment

What are we looking at?



General Conditions of:

- Roof and Penetrations
- Ventilation
- Flashing
- Eaves
- Siding
- Windows
- Doors
- Trim
- Chimney

Photos © 2010 Children's Mercy Hospital

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What are we looking for?

Signs of or Evidence of:

- Deterioration
- Chronic issues
- Pest infestation
- Moisture
- Air/gas infiltration

Photos © 2010 Children's Mercy Hospital

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What are we asking?

- Are some rooms colder than others?
- Have you seen any rats or mice around the outside or inside of your home?
- Have you had any plumbing problems?
- Other examples?


Photos © 2010 Children's Mercy Hospital

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Visually assess all supply & waste water systems

Photos © 2010 Children's Mercy Hospital

Site Visit Field Assessment form

3.0 EHA Room Survey: Bathroom

EHA ID #: _____ Date of Site Visit: _____

	Yes	No	Not Applic.	What issues were observed?	Is this a Health/Safety Hazard? Chronic	Acute	Take Action?
Keep it Ventilated							
Working supply vent							
Supply vent open							
Supply vent unobstructed							
If return vent present - working							
Return vent(s) unobstructed							
Exhaust fan present/operational				Airflow Check: Pass___ Fail___			
If windows present-operational							
Room under (-) pressure				*Note airflow reading			

	Yes	No	NA	What issues were observ	# Identified:		
Keep it Clean							
Excessive visible dust							
Is any carpeting/upholstery present							
Any cloth window coverings present							



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Mechanical Systems, Limited Assessment

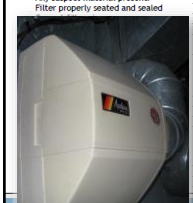
Photos © 2010 Children's Mercy Hospital

Site Visit Field Assessment form

2.0 Mechanical Assessment:

EHA ID #: _____ Date of Site Visit: _____ Is this a Health/Safety Hazard?

Furnace System Type: _____	Yes	No	NA	Take Action?	What issues were observed?	Chronic	Acute
Main box intact							
Exhaust properly attached & sealed					*Note CO readings:		
Exhaust system works (neg. flow)					*Spillage test results: Pass___ Fail___		
Dust covered components							
Returns properly attached and sealed							
Supplies properly attached and sealed							
Any suspect material present?							
Filter properly seated and sealed							



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What are we looking for?

- Visual evidence of damage
- Evidence of moisture issues
- General condition of exhaust vents
  - Check for negative flow
- Are they connected?
- Furnaces, boilers, fireplaces vented
  - Check both ends if possible

Photos © 2010 Children's Mercy Hospital



Home Appliances, Limited Assessment

2.0 Appliance Assessment:

Photos © 2010 Children's Mercy Hospital

Stove Type: _____
Burners/oven operating properly
Gas stoves - No CO detected
___Steel or ___brass gas line
Working exhaust system
Exhausted to outside
Cord condition OK

Washer
Water draining properly
No reported/visible water leaks
GCFI installed/working
Cord condition OK

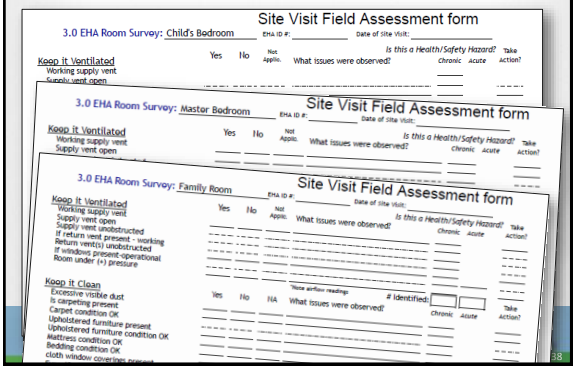


What are we looking for and asking?

- Bath, dryer, and range exhaust fans?
  - Do they work?
  - Are they used?
  - Exhaust to outside?
- Gas stove used as heater?
- Smoke alarm ever go off?
- CO Monitor present and working
  - Ever go off?
- Do they bake or cook for long periods?

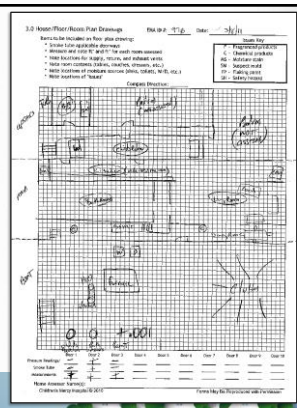
Photo © 2010 Children's Mercy Hospital

Room by Room Assessment



Floor Plan Drawing

- Beneficial for:
  - Locating environmental contaminants in relation to rooms
  - Understanding exposure pathways
  - Remembering Home Layout

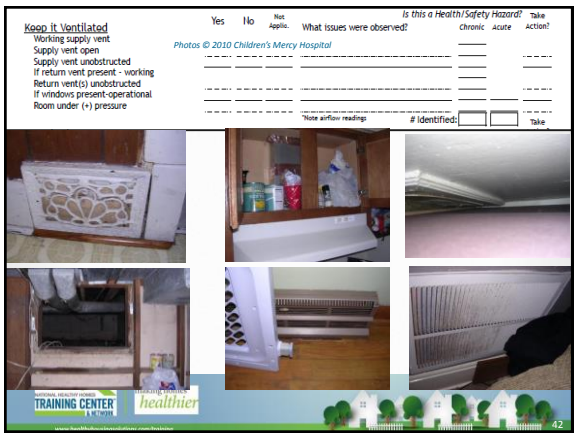


Things to Look for in Rooms

- Windows, do they work?
- Evidence of condensation
- Evidence of moisture stains
- Number of moisture reservoirs
- Number of dust reservoirs
- Lingering odors or stale air
- Level of cleanliness
- Level of clutter
- Smoke alarms observed?
- Unvented gas or kerosene heaters
- Overload electric cords

Good things to ask about rooms

- Is this how this room typically looks?
- Do the windows work?
- Has your smoke detector ever gone off?
- Has your CO detector ever gone off?
- Have you noticed lingering odors?
- Do your windows ever fog?
- Do you have other examples?




Keep It Clean
Yes
No
NA
What issues were observed?
Chronic
Acute
Action?
Excessive visible dust
Is carpeting present
Carpet condition OK
Upholstered furniture present
Upholstered furniture condition OK
Mattress condition OK
Bedding condition OK
cloth window coverings present
Furry/feathered pets allowed in room
Observed clutter
Observed trash/debris on surfaces
Photos © 2010 Children's Mercy Hospital
Identified:
Take
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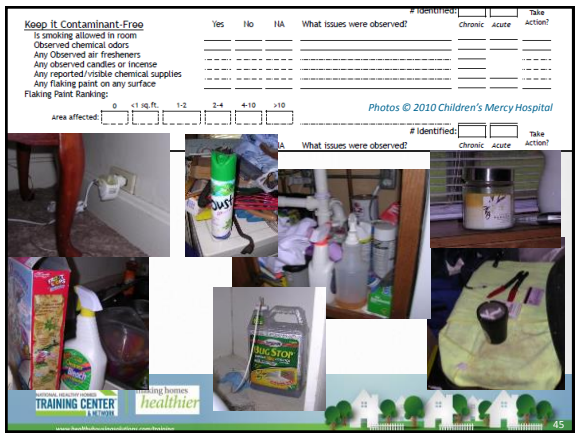
Keep It Contaminant-Free
Yes
No
NA
What issues were observed?
Chronic
Acute
Action?
Is smoking allowed in room
Observed chemical odors
Any Observed air fresheners
Any observed candles or incense
Any reported/visible chemical supplies
Any flaking paint on any surface
Flaking Paint Ranking:
0
<1 sq.ft.
1-2
2-4
4-10
>10
Area affected:
Photos © 2010 Children's Mercy Hospital
Identified:
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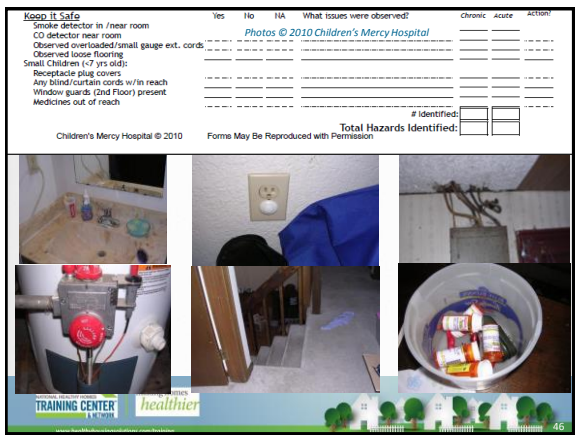
Keep It Safe
Yes
No
NA
What issues were observed?
Chronic
Acute
Action?
Smoke detector in /near room
CO detector near room
Observed overloaded/small gauge ext. cords
Observed loose flooring
Small Children (<7 yrs old):
Receptacle plug covers
Any blind/curtain cords w/in reach
Window guards (2nd Floor) present
Medicines out of reach
Photos © 2010 Children's Mercy Hospital
Identified:
Total Hazards Identified:
Children's Mercy Hospital © 2010
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Extra Focus on Pests

Exercise on Identify Pest Problems

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Visual Identification of Hazards

	Keep it Principles						
AREAS	Dry	Clean	Pest-free	Ventilated	Safe	Contaminant-free	Maintained
Building – exterior shell							
Area around the building							
Mechanical equipment and appliances							
Interior rooms							
Kitchens and bathrooms							

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Identify Pest Problems Exercise

Photo No.	Potential Problems
#1	
#2	
#3	
#4	
#5	
#6	
#7	
#8	
#9	
#10	
#11	
#12	

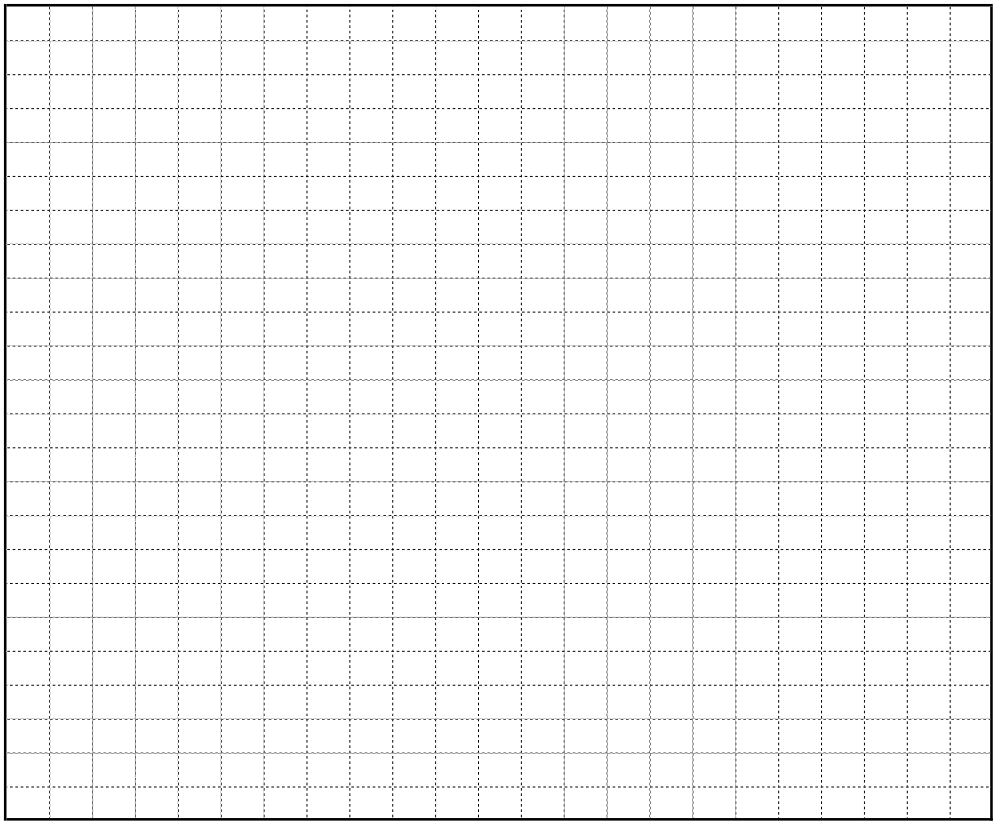
Safe & Healthy Home Assessment

EHA ID #: _____ Date of Site Visit: _____

Name: _____ Phone(s): _____ _____

Address: _____

Site Visit Field Assessment form



Front of House

_____ Compass Direction

General Description of the Site

Primary Ground Cover: ☐ Grass ☐ Dirt ☐ Gravel ☐ Concrete ☐ Other _____

Secondary Ground Cover: ☐ Grass ☐ Dirt ☐ Gravel ☐ Concrete ☐ Other _____

Drainage: ☐ Away from Found. ☐ Toward Found. ☐ F to R ☐ R to F ☐ L to R ☐ R to L

Nearby Pollution Sources

within 500 ft. ☐ Busy Street ☐ Highways ☐ Interstate H. Way ☐ Railroad ☐ Other _____

within 0.25 mi. ☐ Factory ☐ Industrial ☐ Powerplant ☐ Retail ☐ Retail ☐ Other _____

General Description of the Building

Building Location: ☐ Urban ☐ Suburban ☐ Rural ☐ Other _____

Building Type: ☐ House ☐ Duplex ☐ Triplex ☐ Townhome ☐ Other: _____

Approximate Age: ☐ Unknown ☐ Before 1940 ☐ 1940-1959 ☐ 1960-1977 ☐ After 1978

Building Area: _____ ft^2 # of Floors: _____ # of Rooms: _____

Total Number of Windows: _____ Total Number of Entry Doors: _____

Outside Weather Conditions:	Temperature	Relative Humidity	Precipitation

Home Assessor Name(s): _____

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Site Visit Field Assessment form

2.0 Building Assessment:

EHA ID #: _____ Date of Site Visit: _____

Roof

	Yes	No	Not Applic.	What issues were observed?	*Is this a Health/Safety Hazard?* Chronic	Acute	Take Action?
Surface intact							
Any occupant reported/visible leaks							
Any evidence of water damage							
Drip edge condition OK							
Flashing condition OK							
Chimney flashing condition OK							
Ventilation present							

Identified: [ ] [ ]

Exterior Siding

	Yes	No	NA	What issues were observed?	Chronic	Acute	Take Action?
Surface condition OK							
Visible flaking paint							
Any leaks/Moisture retention							
Weatherized w/ no visible gaps							

*Note any moisture meter readings # Identified: [ ]

Guttering

	Yes	No	NA	What issues were observed?	Chronic	Acute	Take Action?
Properly attached and sealed							
Visible flaking paint							
Any leaks/Moisture retention							
Downspouts condition OK							
Splash block/tile condition OK							

*Note any moisture meter readings # Identified: [ ] [ ]

Foundation

	Yes	No	NA	What issues were observed?	Chronic	Acute	Take Action?
Any visible cracks?							
Any occupant reported/visible leaks							
Weatherized w/ no visible gaps							
Any flaking paint on wall surface							
Is crawlspace open to living space?							
If Basement w/ floor							
Any visible cracks?							
Any rprtd/vsbl. seepage/standing water							
Floor drain functioning properly							
Any flaking paint on floor							

*Note any moisture meter readings # Identified: [ ] [ ]

Exterior Doors/Windows/Steps

	Yes	No	NA	What issues were observed?	Chronic	Acute	Take Action?
Surface condition OK							
Visible flaking paint							
Any leaks/Moisture retention							
Weatherized / No visible gaps							
Outside stairs condition OK							

*Note any moisture meter readings # Identified: [ ] [ ]

Home Plumbing

Bathroom

	Supply Yes	Supply No	Supply NA	Supply TA?	Waste Yes	Waste No	Waste NA	Waste TA?	Issues observed?
Main									
Any reported/visible leaks									
Line/Pipe condition OK									
Operating properly									
Kitchen Sink									
Any reported/visible leaks									
Line/Pipe condition OK									
Operating properly									
Tub/Shower									
Any reported/visible leaks									
Line/Pipe condition OK									
Operating properly									
Toilet									
Any reported/visible leaks									
Line/Pipe condition OK									
Operating properly									
Sink									
Any reported/visible leaks									
Line/Pipe condition OK									
Operating properly									

Site Visit Field Assessment form

EHA ID #: _____ Date of Site Visit: _____

2.0 Mechanical Assessment:

Is this a Health/Safety Hazard?

Furnace System Type: _____

	Yes	No	NA	Take Action?	What issues were observed?	Chronic	Acute
Main box intact							
Exhaust properly attached & sealed					*Note CO readings:		
Exhaust system works (neg. flow)					*Spillage test results: Pass____ Fail____		
Dust covered components							
Returns properly attached and sealed							
Supplies properly attached and sealed							
Any suspect material present?							
Filter properly seated and sealed							
Correct filter size							
Pleated filter in use(min. MERV=8)							
Filter condition OK							
Filter changed quarterly (min)							
Furnace Filter Size X					# Identified:		

Humidifier

	Yes	No	NA	TA?	What issues were observed?	Chronic	Acute
Properly attached & sealed							
Any reported/visible leaks							
Any suspect mold visible							
Water supply line connected properly							
					# Identified:		

Central Air

	Yes	No	NA	TA?	What issues were observed?	Chronic	Acute
Any reported/visible leaks							
Condition of coolant line OK							
Condition of condensate hose OK							
Condensate hose extends into drain							
					# Identified:		

Water Heater Type: _____

	Yes	No	NA	TA?	What issues were observed?	Chronic	Acute
Any reported/visible leaks							
Condition of pressure relief valve							
Water temp set ≤ 120°F					Measured Temp. (°F):		
___Steel or ___brass gas line							
Exhaust attached properly					*Note CO readings:		
Exhaust system works (neg. flow)					*Spillage test results: Pass____ Fail____		
					*Note any moisture meter readings # Identified:		

2.0 Appliance Assessment:

Is this a Health/Safety Hazard?

Stove Type: _____

	Yes	No	NA	Take Action?	What issues were observed?	Acute	Chronic
Burners/oven operating properly							
Gas stoves - No CO detected							
___Steel or ___brass gas line							
Working exhaust system							
Exhausted to outside							
Cord condition OK							
					# Identified:		

Washer

	Yes	No	NA	TA?	What issues were observed?		
Water draining properly							
No reported/visible water leaks							
GCFI Installed/working							
Cord condition OK							
					# Identified:		

Dryer Type: _____

	Yes	No	NA	TA?	What issues were observed?	Acute	Chronic
Steel or brass gas line							
Dryer ducting condition							
Dryer duct exhausts to outside							
Cord condition OK							
					# Identified:		

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Site Visit Field Assessment form

3.0 EHA Room Survey: Child's Bedroom EHA ID #: _____ Date of Site Visit: _____

Keep it Ventilated	Yes	No	Not Applic.	What issues were observed?	*Is this a Health/Safety Hazard?* Chronic	Acute	Take Action?
Working supply vent							
Supply vent open							
Supply vent unobstructed							
If return vent present - working							
Return vent(s) unobstructed							
If windows present-operational							
Room under (+) pressure							
				*Note airflow readings	# Identified:		

Keep it Clean	Yes	No	NA	What issues were observed?	Chronic	Acute	Take Action?
Excessive visible dust							
Is carpeting present							
Carpet condition OK							
Upholstered furniture present							
Upholstered furniture condition OK							
Mattress condition OK							
Bedding condition OK							
cloth window coverings present							
Furry/feathered pets allowed in room							
Observed clutter							
Observed trash/debris on surfaces							
					# Identified:		

Keep it Pest-Free	Yes	No	NA	What issues were observed?	Chronic	Acute	Take Action?
Any reported/visible evidence of rodents							
Any reported/visible evidence of insects							
Any food observed in room							
					# Identified:		

Keep it Dry	Yes	No	NA	What issues were observed?	Chronic	Acute	Take Action?
Observed damp smell							
Any visible moisture stains							
Any reported/visible window leaks							
Observed room humidifier							
Any mold smell							
Any observed suspect visible mold							
Visible mold ranking:				*Note any moisture meter readings			

	0	<2 sq.ft.	<10	>10	>30	>100
Area affected:						

					# Identified:		

Keep it Contaminant-Free	Yes	No	NA	What issues were observed?	Chronic	Acute	Take Action?
Is smoking allowed in room							
Observed chemical odors							
Any Observed air fresheners							
Any observed candles or incense							
Any reported/visible chemical supplies							
Any flaking paint on any surface							
Flaking Paint Ranking:							

	0	<1 sq.ft.	1-2	2-4	4-10	>10
Area affected:						

					# Identified:		

Keep it Safe	Yes	No	NA	What issues were observed?	Chronic	Acute	Take Action?
Smoke detector in /near room							
CO detector near room							
Observed overloaded/small gauge ext. cords							
Observed loose flooring							
Small Children (<7 yrs old):							
Receptacle plug covers							
Any blind/curtain cords w/in reach							
Window guards (2nd Floor) present							
Medicines out of reach							
					# Identified:		
					Total Hazards Identified:		

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Site Visit Field Assessment form

3.0 EHA Room Survey: Master Bedroom EHA ID #: _____ Date of Site Visit: _____

Keep it Ventilated

	Yes	No	Not Applic.	What issues were observed?	Is this a Health/Safety Hazard? Chronic	Acute	Take Action?
Working supply vent							
Supply vent open							
Supply vent unobstructed							
If return vent present - working							
Return vent(s) unobstructed							
If windows present-operational							
Room under (+) pressure							

*Note airflow readings # Identified:

Keep it Clean

	Yes	No	NA	What issues were observed?	Chronic	Acute	Take Action?
Excessive visible dust							
Is carpeting present							
Carpet condition OK							
Upholstered furniture present							
Upholstered furniture condition OK							
Mattress condition OK							
Bedding condition OK							
cloth window coverings present							
Furry/feathered pets allowed in room							
Observed clutter							
Observed trash/debris on surfaces							

Identified:

Keep it Pest-Free

	Yes	No	NA	What issues were observed?	Chronic	Acute	Take Action?
Any reported/visible evidence of rodents							
Any reported/visible evidence of insects							
Any food observed in room							

Identified:

Keep it Dry

	Yes	No	NA	What issues were observed?	Chronic	Acute	Take Action?
Observed damp smell							
Any visible moisture stains							
Any reported/visible window leaks							
Observed room humidifier							
Any mold smell							
Any observed suspect visible mold							

Visible mold ranking: *Note any moisture meter readings

	0	<2 sq.ft.	<10	>10	>30	>100
Area affected:						

Identified:

Keep it Contaminant-Free

	Yes	No	NA	What issues were observed?	Chronic	Acute	Take Action?
Is smoking allowed in room							
Observed chemical odors							
Any Observed air fresheners							
Any observed candles or incense							
Any reported/visible chemical supplies							
Any flaking paint on any surface							

Flaking Paint Ranking:

	0	<1 sq.ft.	1-2	2-4	4-10	>10
Area affected:						

Identified:

Keep it Safe

	Yes	No	NA	What issues were observed?	Chronic	Acute	Take Action?
Smoke detector in /near room							
CO detector near room							
Observed overloaded/small gauge ext. cords							
Observed loose flooring							
Small Children (<7 yrs old):							
Receptacle plug covers							
Any blind/curtain cords w/in reach							
Window guards (2nd Floor) present							
Medicines out of reach							

Identified:

Total Hazards Identified:

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Site Visit Field Assessment form

3.0 EHA Room Survey: Family Room EHA ID #: _____ Date of Site Visit: _____

Keep it Ventilated

	Yes	No	Not Applic.	What issues were observed?	*Is this a Health/Safety Hazard?* Chronic	Acute	Take Action?
Working supply vent							
Supply vent open							
Supply vent unobstructed							
If return vent present - working							
Return vent(s) unobstructed							
If windows present-operational							
Room under (+) pressure							
				*Note airflow readings	# Identified:		

Keep it Clean

	Yes	No	NA	What issues were observed?	Chronic	Acute	Take Action?
Excessive visible dust							
Is carpeting present							
Carpet condition OK							
Upholstered furniture present							
Upholstered furniture condition OK							
Mattress condition OK							
Bedding condition OK							
cloth window coverings present							
Furry/feathered pets allowed in room							
Observed clutter							
Observed trash/debris on surfaces							
					# Identified:		

Keep it Pest-Free

	Yes	No	NA	What issues were observed?	Chronic	Acute	Take Action?
Any reported/visible evidence of rodents							
Any reported/visible evidence of insects							
Any food observed in room							
					# Identified:		

Keep it Dry

	Yes	No	NA	What issues were observed?	Chronic	Acute	Take Action?
Observed damp smell							
Any visible moisture stains							
Any reported/visible window leaks							
Observed room humidifier							
Any mold smell							
Any observed suspect visible mold							
Visible mold ranking:				*Note any moisture meter readings			

	0	<2 sq.ft.	<10	>10	>30	>100
Area affected:						

	# Identified:		

Keep it Contaminant-Free

	Yes	No	NA	What issues were observed?	Chronic	Acute	Take Action?
Is smoking allowed in room							
Observed chemical odors							
Any Observed air fresheners							
Any observed candles or incense							
Any reported/visible chemical supplies							
Any flaking paint on any surface							
Flaking Paint Ranking:							

	0	<1 sq.ft.	1-2	2-4	4-10	>10
Area affected:						

	# Identified:		

Keep it Safe

	Yes	No	NA	What issues were observed?	Chronic	Acute	Take Action?
Smoke detector in /near room							
CO detector near room							
Observed overloaded/small gauge ext. cords							
Observed loose flooring							
Small Children (<7 yrs old):							
Receptacle plug covers							
Any blind/curtain cords w/in reach							
Window guards (2nd Floor) present							
Medicines out of reach							
					# Identified:		
					Total Hazards Identified:		

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Site Visit Field Assessment form

3.0 EHA Room Survey: Kitchen EHA ID #: _____ Date of Site Visit: _____

	Yes	No	Not Applic.	What issues were observed?	*Is this a Health/Safety Hazard?* Chronic	Acute	Take Action?
Keep it Ventilated							
Working supply vent							
Supply vent open							
Supply vent unobstructed							
If return vent present - working							
Return vent(s) unobstructed							
Exhaust fan present/operational				Airflow Check: Pass____Fail____			
If windows present-operational							
Room under (-) pressure*							
				*Note airflow readings # Identified:			
Keep it Clean	Yes	No	NA	What issues were observed?	Chronic	Acute	TA?
Excessive visible dust							
Is any carpeting/upholstery present							
Any cloth window coverings present							
Any furry/feathered pets in room							
Observed clutter							
Observed trash/debris on surfaces							
				# Identified:			
Keep it Pest-Free	Yes	No	NA	What issues were observed?	Chronic	Acute	TA?
Any reported/visible evidence of rodents							
Any reported/visible evidence of insects							
Bulk food in containers							
Trash stored in container w/ lid							
Any observed cracks/gaps around cabinets							
				# Identified:			
Keep it Dry	Yes	No	NA	What issues were observed?	Chronic	Acute	TA?
Observed damp smell							
Any visible moisture stains							
Any reported/visible window leaks							
Observed room humidifier							
Any mold smell							
Any observed suspect visible mold							
Visible mold ranking:				*Note any moisture meter readings			
0 <2 sq.ft. <10 >10 >30 >100							
Area affected:							
				# Identified:			
Keep it Contaminant-Free	Yes	No	NA	What issues were observed?	Chronic	Acute	TA?
Is smoking allowed in room							
Observed chemical odors							
Any Observed air fresheners							
Any observed candles or incense							
Any reported/visible chemical supplies							
Chemicals stored in orig. container							
Food stored away from chemicals							
Any flaking paint on any surface							
Flaking Paint Ranking:							
0 <1 sq.ft. 1-2 2-4 4-10 >10							
Area affected:							
				# Identified:			
Keep it Safe	Yes	No	NA	What issues were observed?	Chronic	Acute	TA?
Smoke detector in /near room							
CO detector near room							
Fire extinguisher present & working							
Chemicals stored in childproof cab.							
Water temp set < 120°F							
GFCI near water sources							
No overloaded/small gauge ext. cords							
No loose flooring							
Small Children (<7 yrs old):							
Receptacle plug covers							
Cabinet locks on doors							
No blind/curtain cords w/in reach							
Medicines out of reach							
				# Identified:			
				Total Hazards Identified:			

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Site Visit Field Assessment form

3.0 EHA Room Survey: Bathroom EHA ID #: _____ Date of Site Visit: _____

	Yes	No	Not Applic.	What issues were observed?	*Is this a Health/Safety Hazard?* Chronic	Acute	Take Action?
Keep it Ventilated							
Working supply vent							
Supply vent open							
Supply vent unobstructed							
If return vent present - working							
Return vent(s) unobstructed							
Exhaust fan present/operational				Airflow Check: Pass____ Fail____			
If windows present-operational							
Room under (-) pressure							
				*Note airflow readings # Identified:			
Keep it Clean	Yes	No	NA	What issues were observed?	Chronic	Acute	TA?
Excessive visible dust							
Is any carpeting/upholstery present							
Any cloth window coverings present							
Any furry/feathered pets in room							
Observed clutter							
Observed trash/debris on surfaces							
				# Identified:			
Keep it Pest-Free	Yes	No	NA	What issues were observed?	Chronic	Acute	TA?
Any reported/visible evidence of rodents							
Any reported/visible evidence of insects							
Trash stored in container w/ lid							
Any observed cracks/gaps around cabinets							
				# Identified:			
Keep it Dry	Yes	No	NA	What issues were observed?	Chronic	Acute	TA?
Observed damp smell							
Any visible moisture stains							
Any reported/visible window leaks							
Observed room humidifier							
Any mold smell							
Any observed suspect visible mold							
Visible mold ranking:				*Note any moisture meter readings			
0 <2 sq.ft. <10 >10 >30 >100							
Area affected:							
				# Identified:			
Keep it Contaminant-Free	Yes	No	NA	What issues were observed?	Chronic	Acute	TA?
Is smoking allowed in room							
Observed chemical odors							
Any Observed air fresheners							
Any observed candles or incense							
Any reported/visible chemical supplies							
Chemicals stored in orig. container							
Any flaking paint on any surface							
Flaking Paint Ranking:							
0 <1 sq.ft. 1-2 2-4 4-10 >10							
Area affected:							
				# Identified:			
Keep it Safe	Yes	No	NA	What issues were observed?	Chronic	Acute	TA?
Smoke detector in /near room							
CO detector near room							
Chemicals stored in childproof cab.							
Water temp set ≤ 120°F							
GFCI near water sources							
No overloaded/small gauge ext. cords							
No loose flooring							
Small Children (<7 yrs old):							
Receptacle plug covers							
Cabinet locks on doors							
No blind/curtain cords w/in reach							
Medicines out of reach							
				# Identified:			
				Total Hazards Identified:			

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Site Visit Field Assessment form

3.0 EHA Room Survey: Basement EHA ID #: _____ Date of Site Visit: _____

Keep it Ventilated

	Yes	No	Not Applic.	What issues were observed?	Is this a Health/Safety Hazard? Chronic	Acute	Take Action?
Working supply vent							
Supply vent open							
Supply vent unobstructed							
No return vent(s) present							
No crawlspace open to room							
If windows present-operational							
Room under (-) pressure							

*Note airflow readings

Identified:

Keep it Clean

	Yes	No	NA	What issues were observed?	Chronic	Acute	TA?
Excessive visible dust							
Is any carpeting/upholstery present							
Any cloth window coverings present							
Any furry/feathered pets in room							
Observed clutter							
Observed plant pots filled with dirt							
Observed open/unused cardboard boxes							
Observed trash/debris on surfaces							

Identified:

Keep it Pest-Free

	Yes	No	NA	What issues were observed?	Chronic	Acute	TA?
Any reported/visible evidence of rodents							
Any reported/visible evidence of insects							
Bulk food in containers							
Trash stored in container w/ lid							
Any observed cracks/gaps around cabinets							

Identified:

Keep it Dry

	Yes	No	NA	What issues were observed?	Chronic	Acute	TA?
Observed damp smell							
Any visible moisture stains							
Any reported/visible window leaks							
Observed room humidifier							
Any mold smell							
Any observed suspect visible mold							

Visible mold ranking: *Note any moisture meter readings

	0	<2 sq.ft.	<10	>10	>30	>100
Area affected:						

Identified:

Keep it Contaminant-Free

	Yes	No	NA	What issues were observed?	Chronic	Acute	TA?
Is smoking allowed in room							
Observed chemical odors							
Any Observed air fresheners							
Any observed candles or incense							
Any reported/visible chemical supplies							
Chemicals stored in orig. container							
Any flaking paint on any surface							

Flaking Paint Ranking:

	0	<1 sq.ft.	1-2	2-4	4-10	>10
Area affected:						

Identified:

Safety & Injury Prevention

	Yes	No	NA	What issues were observed?	Chronic	Acute	TA?
Smoke detector in /near room							
CO detector near room							
Chemicals stored in childproof cab.							
GFCI near water sources							
No overloaded/small gauge ext. cords							
No loose flooring							
Handrails on stairs (>3 steps)							
Adequate stair lighting							
Small Children (<7 yrs old):							
Receptacle plug covers							
Cabinet locks on doors							

Identified:

Total Hazards Identified:

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Site Visit Field Assessment form

5.0 EHA Attached Structure Assessment

EHA ID #: _____ Date of Site Visit: _____

Attached Garage

Keep it Ventilated	Yes	No	Not Applic.	What issues were observed?	Is this a Health/Safety Hazard? Chronic	Acute	Take Action?
Is crawlspace open to room							
Garage Door Condition OK							
Any openings to living space							
Any return vent(s) present							
Room under (-) pressure*							
				*Note airflow readings	# Identified:		

Keep it Clean	Yes	No	NA	What issues were observed?	Chronic	Acute	TA?
Any reported/visible evidence of rodents							
Any reported/visible evidence of insects							
Observed open/unused cardboard boxes							
Any observed trash/debris/clutter							
				# Identified:			

Keep it Dry	Yes	No	NA	What issues were observed?	Chronic	Acute	TA?
Observed damp smell							
Any visible moisture stains							
Any mold smell							
Any observed suspect visible mold							
Visible mold ranking:				*Note any moisture meter readings			
0 <2 sq.ft. <10 >10 >30 >100							
Area affected:							
				# Identified:			

Keep it Contaminant-Free	Yes	No	NA	What issues were observed?	Chronic	Acute	TA?
Is smoking allowed in room							
Any reported/observed idling vehicles							
Observed chemical odors							
Any reported/visible chemicals							
Chemicals stored in orig. container							
Observed flaking paint on any surface							
				# Identified:			

Keep it Safe	Yes	No	NA	What issues were observed?	Chronic	Acute	TA?
Chemicals stored in childproof cab.							
Any overloaded/small gauge ext. cords							
Fire Extinguisher present/working							
Adequate stair lighting							
				# Identified:			

Porches/Decks

Keep it Clean & Pest-Free	Yes	No	NA	What issues were observed?	Chronic	Acute	TA?
Any reported/visible evidence of rodents							
Any reported/visible evidence of insects							
An observed open/unused cardboard boxes							
Any observed trash/debris/clutter							
				# Identified:			

Keep it Dry	Yes	No	NA	What issues were observed?	Chronic	Acute	TA?
Any visible moisture stains							
Any Visible Leaks*							
Observed mold smell							
Any observed suspect visible mold							
				*Note any moisture meter readings # Identified:			

Keep it Contaminant-Free	Yes	No	NA	What issues were observed?	Chronic	Acute	TA?
Any observed chemical odors							
Any reported/visible chemicals							
Chemicals stored in orig. container							
Any flaking paint on any surface							
Flaking Paint Ranking:							
0 <1 sq.ft. 1-2 2-4 4-10 >10							
Area affected:							
				# Identified:			

Keep it Safe	Yes	No	NA	What issues were observed?	Chronic	Acute	TA?
Any Observed Loose Flooring							
Handrails on Stairs							
Adequate Stair lighting							
				# Identified:			

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Site Visit Field Assessment form

3.0 House/Floor/Room Plan Drawings

EHA ID #: _____ Date: _____

Items to be included on floor plan drawing:

* Smoke tube applicable doorways
* Measure and note ft^2 and ft^3 for each room assessed
* Note locations for supply, return, and exhaust vents
* Note room contents (tables, couches, dressers, etc.)
* Note locations of moisture sources (sinks, toilets, W/D, etc.)
* Note locations of "issues"

Issues Key

F -	Fragranced products
C -	Chemical products
MS -	Moisture stain
SM -	Suspect mold
FP -	Flaking paint
SH -	Safety hazard

Compass Direction: _____

	Door 1	Door 2	Door 3	Door 4	Door 5	Door 6	Door 7	Door 8	Door 9	Door 10
Pressure Readings/										
Smoke Tube										
Measurements										

Home Assessor Name(s): _____

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Site Visit Field Assessment form

4.0 Field Notes and Calculations

EHA ID #: _____ Date: _____

Home Assessor Name(s): _____

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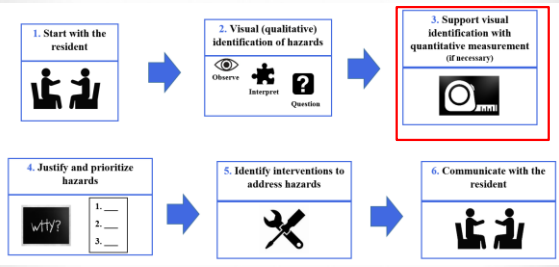
Module 4
Step 3: Support Visual Identification with Quantitative Measurement

Healthy Housing Solutions Inc.

Key Steps



Module Content

- When to use quantitative measurement (as a support for qualitative assessment)
- Selecting the right tool or sampling method
- List of basic quantitative tools an evaluator should have
- Introduction to using basic quantitative tools
- Understanding data results
- Connecting results to evidence-based practice
- Case study

Quantitative Measurement

A back to the basics moment . . .

What is the difference between a qualitative and a quantitative assessment?

Use Quantitative Tests when necessary to:

Inform both identification and intervention

Provide baseline and visual indication of hazards for occupants.

Questions Covered in This Module

1. Do I need to do quantitative measurement or collect a sample?
2. If yes, how do I select and use the right tool or sampling method?
3. What will my data look like?
4. How do I connect my results to evidence-based practice?

Question 1: Do I need to do a quantitative measurement or collect a sample?

Question 1: Do I need to do a quantitative measurement or collect a sample?

Do I see, feel, hear or smell a possible hazard and need to confirm whether it is a problem or not?

- **Yes** → I need to do quantitative measurement / have a sample collected
- **No** → Does the resident report an issue even though I don't see, feel, hear or smell a hazard?
  - **No** → STOP
  - **Yes** → I need to do quantitative measurement / have a sample collected

Example 1

- You don't see anything wrong with any of the gas appliances in a house.
- But the resident reports symptoms that sound like CO poisoning.

Do you need do quantitative measurement?

Example 2

You see suspect mold on the interior of the basement wall.

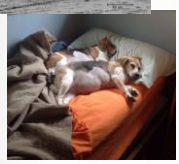
Do you need to do quantitative measurement?

Example 3

You observe a variety of surfaces in a home that are extremely damp but you don't directly observe any suspect mold.

Do you need to support your visual assessment with quantitative measurement?

Example 4



- Your thermo hygrometer measures a somewhat high level of relative humidity in the house you are assessing.
- The resident told you that her son has a dust mite allergy but is pretty sure she dusts often enough and is not sure why her son is still having allergy symptoms.
- You think there might be a high level of dust mite allergen in the house despite the resident's cleaning, but maybe it's the family's dogs that are the problem?

Do you need to do quantitative measurement?

Question 2:
How do I select and use the right tool or sampling method?

Diagnostics – don't leave home without them

Your most important diagnostic tools are . . .


Your brain. To understand how a house's systems work.


Your eyes. To see the details of a hazard.


Your nose. To smell clues that may indicate a hazard.


Your ears. To hear clues that may indicate a hazard.


Your ability to breathe. To sense clues that may indicate an indoor air quality hazard.

How can you use these same diagnostics to relate to your client?

Question 2: How do I select and use the right tool or sampling method?

Yes → I need to do quantitative measurement / have a sample collected

Okay, what tool should I use?

1. What is the purpose of the measurement?
2. What are the characteristics of the data that I need my measurement to produce?

Question 2: How do I select and use the right tool or sampling method?

1. What is the purpose of the measurement?
2. What are the characteristics of the data that I need my measurement to produce?

I need to determine if there is enough air flow in a bedroom. My client tells me it often seems stuffy in the bedroom.

Maybe I'll use a vapor generator.

No, that only tells me which way the air flow is.

I'll use a velometer. That will tell me how much air is flowing in cubic feet per minute.

Question 2: How do I select and use the right tool or sampling method?

Tool Options

Basic quantitative measurement tools:

1. Combustible gas meter
2. Vapor generator / smoke stick
3. Carbon monoxide detector
4. Thermo-hygrometer (Portable psychrometer)
5. Infrared thermometer
6. Moisture meter

Advanced quantitative measurement tools:

1. Velometer
2. Manometer
3. Flow hood
4. Blower Door
5. Particle counter
6. Carbon dioxide detector

Premium quantitative measurement tools:

1. Formaldehyde detector
2. Multi-gas detector
3. Nitrogen dioxide detector

Question 2: How do I select and use the right tool or sampling method?

Question 2: How do I select and use the right tool or sampling method?

Tool	What it measures:
Combustible gas meter	Combustible gases, including: natural gas, propane, and methane
vapor generator / smoke stick	Direction of air flow
Carbon monoxide detector	Carbon monoxide gas
Thermo-hygrometer	Temperature and humidity
Infrared thermometer	Surface temperature of objects
Moisture meter	Moisture content in wood or drywall

Question 2: How do I select and use the right tool or sampling method?

Understanding instrument variables:

- **Accuracy**
  - Ability to detect true value of a measured quantity
- **Range**
  - Low and high values that encompass the purpose of measuring a given parameter
- **Resolution**
  - Increment of change an instrument can detect
- **Sensitivity**
  - Smallest increment that can initially be detected

Question 2: How do I select and use the right tool or sampling method?

A reminder of the decision flow for tool selection:

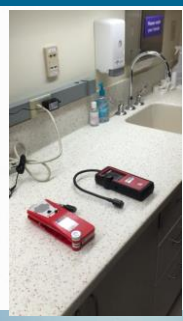
Determine the scope and purpose of the assessment.

Determine the data quality objectives

Determine the sufficient validity and sensitivity to verify the presence or absence of a contaminant

Question 2: How do I select and use the right tool or sampling method?

Combustible gas meter



Click to launch video

Question 2: How do I select and use the right tool or sampling method?

Carbon Monoxide detector

Click to launch video

Question 2: How do I select and use the right tool or sampling method?

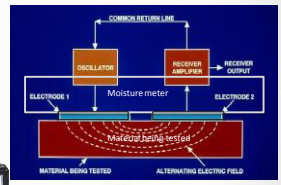
Moisture meters

Click to launch video

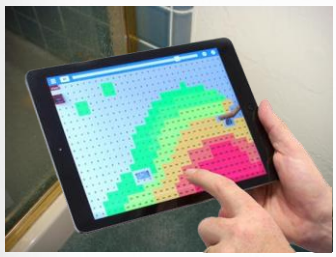
Diagnostics – Moisture meters

Basic Types:

- Pin Type
  - resistance
- Impedance Type
  - capacitance
- Combination units
  - Resistance and capacitance in one



Diagnostics – Moisture meters



Question 2: How do I select and use the right tool or sampling method?

vapor generator / smoke stick

Always have the Safety Data Sheets

Click to launch video

Diagnostics – basic to advanced

IR Camera

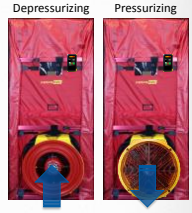
Powered flow hood

Passive flow hood

Blower Door

Depressurizing

Pressurizing



Inside the house

Pressure Pan

Question 2: How do I select and use the right tool or sampling method?

Thermo-hygrometer

Click to launch video

Standard Operating Procedure

Quantitative Instrument Training

Quantitative Instrument Training Worksheet:

Instrument Name: _____ Brand: _____ Type: _____

What is the purpose of this instrument?

To Measure- _____

What hazards do you use this device to assess?

1. _____

2. _____

3. _____

What units of measure does this device use?

Test: _____ Units of Msrmnt.: _____ Test: _____ Units of Msrmnt.: _____

Test: _____ Units of Msrmnt.: _____ Test: _____ Units of Msrmnt.: _____

SAMPLING

Sampling Options

Basic quantitative sampling:

1. Surface sample
   - Mold
2. Vacuum sample
   - Dust mites
3. Wipe sample
   - Lead
4. Bulk sample (e.g. asbestos)

Training and licensing usually required for this work.

Advanced quantitative sampling:

1. Chemical air sample (e.g. formaldehyde, nicotine, VOCs)

Premium quantitative measurement sampling:

1. Mold air sample
2. Passive badge sampling
3. Chemical air sample (mVOCs)

CHAIN OF CUSTODY

Special issues for sampling:

- Chain-of-Custody (COC)
- Accredited testing labs

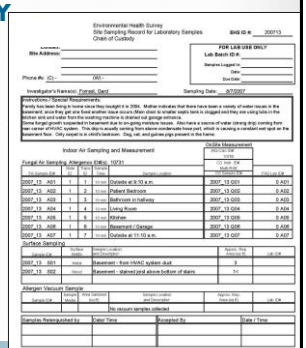
FYI - Individuals are Certified. Labs are Accredited

Free training on chain of custody from the U.S. Environmental Protection Agency:
https://www.apti-learn.net/LMS/EPAHomePage.aspx

CHAIN OF CUSTODY

COC should include:

- Project & Sample ID
- Type of Sample
- Date, Time, Sample Location
- Air Samples: Time, Flow Rate
- Name of Sampler
- Signature and Date of Relinquishment to Lab



Aseptic Technique

Aseptic technique involves using procedures that will not contaminate a sample:

- Do not touch critical areas of a sample
- Do not cross contaminate samples
- **Ideally surface sampling should only be conducted after all air samples have been collected**

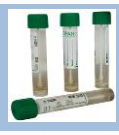
Surface Samples

	Swab	Tape
Turnaround time	Quick turnaround time	Quick turnaround time
Testing area	Large composite areas can be tested	Limited to tape surface area
Durability	Compact and rugged	Can break
Shelf life	Limited shelf life	Unlimited shelf life
Contamination potential	Inherently aseptic	More likely to be contaminated

Sample this.

Suspect Mold

Swab surface sample



Tape surface sample

Dust mites

Vacuum sample

Question 2: How do I select and use the right tool or sampling method?

Exercise- Sampling Worksheet

Sampling Worksheet

1. Sampling Method: _____

What hazards do you use this type of sampling to collect samples for?

1. _____
2. _____
3. _____

What are the basic pieces of equipment needed to perform this kind of sampling?

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

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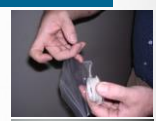
Question 2: How do I select and use the right tool or sampling method?

Surface sampling for mold

- Use clear adhesive tape,
- Avoid touching the sticky side of the tape,
- Press the tape gently onto the surface you want to test,
- Peel the tape off of the surface using the edges of the tape,
- Apply stick tape to the inside of a ziplock bag, do not fold the tape,
- Close bag and label appropriately,
- Fill out the chain of custody form and submit to lab.



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Dust Sampling

DustCheck™ or CarpetChek™

- Can collect history
- Pollen
- Animal Dander
- Other Allergen as a Screening

Limitations

- *Sampling for settled dust – not necessarily active growth*

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Question 2: How do I select and use the right tool or

Vacuum sampling for dust mites

Basic steps*

1. Locate area to sample
2. Plug in HEPA Filtered vacuum
3. Connect nozzle and insert/attach filter sleeve
4. Tilt the nozzle/vacuum attachment during collection and cover selected area twice.
5. Remove the filter sleeve / fold to trap dust inside
6. Label samples and record data.
7. Record Collection Data.
8. Ship sample to laboratory for testing.

**** These basic steps do NOT take into account many additional instructions you would need to follow.***

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Question 2: How do I select and use the right tool or sampling method?

Know your limitations.

Wipe sampling for lead

Homeowners should have qualified lead inspectors or lead risk assessors evaluate and test a home for lead.

Asbestos

Bulk sampling

Only trained and certified asbestos professionals should take asbestos samples.

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Question 3: What will my data look like?

42

Question 3: What will my data look like?

Combustible gas meter	
Vapor generator / smoke stick	 Direction of air flow
Carbon monoxide detector	PPM Parts per million

43

Question 3: What will my data look like?

Thermo-hygrometer (Portable psychrometer)	 **Air Temperature** **% Relative humidity**
Infrared thermometer	 **Surface Temperature**
Moisture meter	 **Level of moisture in wood and drywall**

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Question 3: What will my data look like?

Unit	Unit abbreviation	Hazard
parts per million	ppm	carbon monoxide
parts per billion	ppb	nitrogen dioxide, formaldehyde
micrograms per gram	µg/g	dust mite
micrograms per gram or units per gram	µg/g or U/gram	cockroach allergen
milligram per liter	mg/L	lead in water
micrograms per deciliter	µg/dL	lead in blood
milligram per kilogram	mg/Kg	Lead in soil
picocuries per liter	pCi/L	radon
micrograms per cubic meter	µm/m3	particulate matter 2.5
nanometer	Nm	Chemicals in the air

µ NOT u

45

Question 3: What will my data look like?

Units for fungal spores:

- Surface or swab samples
  - Rank or score
  - CFUs = Colony Forming Units

Units for allergens:

- Micrograms per gram = µ /g
- Units per gram = UI/g

Question 3: What will my data look like?

Examples in your binder

- Quality Control Checks
- Maintenance and service log
- Quantitative measurement from data log
- Laboratory sample analysis report

Question 4: How do I connect my results to evidence-based practice?

Question 4: How do I connect my results to evidence-based practice?

Hazard	Health standards
Carbon monoxide	Average level should not be above 6 parts per million. Maximum level in a 15 minute period should not be above 87 parts per million.
Radon	Level should not be above 4 picocuries per liter of air.

Health standards also exist for:
- formaldehyde,
- carbon dioxide and nitrogen dioxide,
- indoor particulate matter, and
- dust mite, cat, mouse and cockroach allergen levels.

See the list of Advanced Quantitative Measurement Tools

Question 4: How do I connect my results to evidence-based practice?

Dampness and Mold

The relationship between dampness, mold exposure and health effects cannot be quantified precisely.

There are no quantitative health-based guidelines or thresholds that can be recommended for acceptable levels of contamination with mold.

World Health Organization's Guidelines for Indoor Air Quality, Dampness and Mould, © World Health Organization 2009

Question 4: How do I connect my results to evidence-based practice?

Allergens

Environmental Allergen	Published Threshold (µg/g)
Dust Mite (Der p 1)	2
Dust Mite (der f 1)	2
Cat (fel d 1)	8
Dog (Can f 1)	10
German Cockroach (Bla g 1)	2 U/gram
German Cockraoch (Bla g 2)	0.04
Mouse (Mus m 1)	1.6

Salo PM, Arbes SJ, Jr., Crockett PW, Thorne PS, Cohn RD, Zeldin DC. Exposure to multiple indoor allergens in US homes and its relationship to asthma. J Allergy Clin Immunol. 2008;121(3):678-84 e2. Epub 2008/02/08.

Case Study – The Orlovs are back Part 2

- Review the case study details as necessary.
- Fill out the form for this exercise to:
  - State whether you would use quantitative measurement for this case,
  - If yes, identify the quantitative assessment tool you would use,
- Small groups report back to class.

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Quantitative Instrument Worksheet [COMPLETED]:

Instrument Name: __Gas Alert Extreme_ Brand: _BW_ Type: _CO Detector_

What is the purpose of this instrument?

To Measure- __CO levels in the home or near combustion appliance_____

What hazards do you use this device to assess?

1. exhaust that is not efficient – nor exhausting combustion by-product_____

2. _gas leaks in the home_____

3. _____

What units of measure does this device use?

Test: __CO____ Units of Msrmnt.: __ppm__ Test: _____ Units of Msrmnt.: _____

Test: _____ Units of Msrmnt.: _____ Test: _____ Units of Msrmnt.: _____

Describe the basic steps for starting to work with this instrument.

1. Press the power button and hold for several seconds. Unit will turn on and go through start-up procedures.

2. _Press "0" then instrument start-up and self-test is complete_____

_____

3. __Monitor CO levels & record values for each location assessed /investigated_____

_____

4. Press and hold power button & hold for 5 seconds to shut-off instrument

_____

What are 2 advantages to using this device for home assessment work?

1. Detects CO in home at lower levels than commercial CO detector

_____

2. Can be used to detect insufficient exhaust flow from combustion appliances

_____

What are 2 limitations to using this device for home assessment work?

1. This is not the endpoint of CO sampling

_____

2. Snapshot in time

_____

Quantitative Instrument Worksheet [COMPLETED]:

When is it appropriate to use this instrument?

For any home assessment /investigation

Instrument Name: _Heavy duty Psychrometer & IR Thermometer__
Brand: _Extech__ Type: ___Handheld with digital display__

What is the purpose of this instrument?

To Measure- Air temp, surface temp, wet bulb temp, dew point temp and % RH

What hazards do you use this device to assess?

1. High or low % relative humidity- moisture issues or condition too dry

2. At what temperatures condensation will form on surfaces

What units of measure does this device use?

Test: Relative Humidity Units of Msrmnt.: %RH Test: wet bulb Units of Msrmnt.: F & C

Test: temp Units of Msrmnt.: F & C Test: dew point Units of Msrmnt.: F & C
(K, IR, AIR)

Describe the basic steps for starting to work with this instrument.

1. Press the "O" button to turn power on

2. Upper display will indicate air temp, wet bulb or dew point temp, & %RH. * press the WB/DP button to toggle between air, WB or DP

3. Lower display will indicate K temp or IR temp *type K will display " " if K-probe is not inserted into meter

4. For IR: point IR towards surface to be measured; press the IRT button to begin measuring surface temp; IR temp and triangle icon will appear on display

5. Measured IR temp will appear on lower display; when IRT button is released, laser point will switch off & data will freeze for 7 seconds.

What are 2 advantages to using this device for home assessment work?

1. Versatile instrument (surface, air& water temp, %RH, web bulb or DP temp

2. Determine when condensation will form

Quantitative Instrument Worksheet [COMPLETED]:

What are 2 limitations to using this device for home assessment work?

1. snapshot in time

When is it appropriate to use this instrument?

For basic environmental conditions and moisture investigation

---

Instrument Name: Air flow indicator Brand: _Dragon Puffer Type: _____

What is the purpose of this instrument?

To Measure Air movement; direction of air flow

What hazards do you use this device to assess?

1. _Combustion appliances – that they are exhausting gases
2. _Exhaust fans- that they are operating correctly(-flow)
3. _Crawls spaces, attics, & penetrations – is air coming in from uncontrolled spaces

What units of measure does this device use?

Test: Air flow Units of Msrmnt.: "+" or "-" pressure Test: _____ Units of Msrmnt.: _____

Test: _____ Units of Msrmnt.: _____ Test: _____ Units of Msrmnt.: _____

Describe the basic steps for starting to work with this instrument.

1. Remove pin inserted in trigger so that smoke can be generated
2. Depress trigger on Dragon puffer
3. Turn power on at the IAQ tip
4. Use in areas of concern or in designated areas

What are 2 advantages to using this device for home assessment work?

1. Non-toxic, kosher, great educational tool

---

2. To determine direction of air flow

Quantitative Instrument Worksheet [COMPLETED]:

What are 2 limitations to using this device for home assessment work?

1. Air flow directions can change when systems are on/off or door opened/closed

2. Snapshot in time

When is it appropriate to use this instrument?

When trying to determine if exhausts are operational or air coming from uncontrolled sources

Instrument Name: Combustible Gas Detector Brand: _TIF___ Type: _____

What is the purpose of this instrument?

To Measure- _ Combustible gas leaks _____

What hazards do you use this device to assess?

1. Gas leaks (lines, fittings, joints, connections)

2. Check for incomplete combustion

What units of measure does this device use?

Test: Combustible gas Units of Msrmnt.: as low as 5 ppm for gasoline

Test: _____ Units of Msrmnt.: _____ Test: _____ Units of Msrmnt.: _____

Describe the 5 basic steps for starting to work with this instrument.

1. Turn sensitivity knob counter clockwise

2. Turn the instrument on in a non-contaminated environment. Power light should be lit, no sound should be heard

3. After instrument warms up, an infrequent ticking noise should be heard

4. Adjustment of sensitivity knob for desired sensitivity is: rapid ticking= high, slow-ticking=low

5. Search for leaks. When a detectable compound is encountered, tick rate speeds up and red LED's will display

Quantitative Instrument Worksheet [COMPLETED]:

What are 2 advantages to using this device for home assessment work?

1. Detects low level gas leaks in the home

2. Prevents occupant exposure to natural gas leaks

What are 2 limitations to using this device for home assessment work?

1. Only detects to 5ppm (gasoline)

2. Doesn't detect all combustible compounds

When is it appropriate to use this instrument?

For any home assessment/investigation

Instrument Name: ___ Brand: _____ Type: _Moisture meters

What is the purpose of this instrument?

To Measure- Moisture content of building materials_____

What hazards do you use this device to assess?

1. _Moisture leaks & other unresolved moisture issues_____

What units of measure does this device use?

Test: Percent Moisture Units of Msrmnt.: % moisture (wood is the scale)
Test: _____ Units of Msrmnt.: _____

Test: _____ Units of Msrmnt.: _____ Test: _____ Units of Msrmnt.: _____

Describe the basic steps for starting to work with this instrument.

1. Turn Power on

2. Survey mode is initially used for moisture identification & extent of moisture damage

3. For measure mode, expose pins and insert pins into suspected wet building materials

Quantitative Instrument Worksheet [COMPLETED]:

What are 2 advantages to using this device for home assessment work?

1. Used to identify presence of moisture issues

2. Used to identify extent of moisture issues

What are 2 limitations to using this device for home assessment work?

1. Can be destructive & can identify false-positives

2. Snapshot in time

When is it appropriate to use this instrument? Can be used in any home assessment/investigation that involves suspect or visible moisture issues

Instrument Name: _____ Brand: _____ Type: _____

What is the purpose of this instrument?

To Measure- _____

What hazards do you use this device to assess?

1. _____

2. _____

3. _____

What units of measure does this device use?

Test: _____ Units of Msrmnt.: _____ Test: _____ Units of Msrmnt.: _____

Test: _____ Units of Msrmnt.: _____ Test: _____ Units of Msrmnt.: _____

Describe the 5 basic steps for starting to work with this instrument?

1. _____

_____

2. _____

_____

Quantitative Instrument Worksheet [COMPLETED]:

3. _____

_____

4. _____

_____

5. _____

_____

What are 2 <u>advantages</u> to using this device for home assessment work?

1.

_____

2.

What are 2 <u>limitations</u> to using this device for home assessment work?

1.

_____

2.

When is it appropriate to use this instrument?

Quantitative Instrument Training Worksheet

1. Instrument Name:_____ **Brand:**_____ **Type:** _____

What is the purpose of this instrument?

To Measure: _____

What hazards do you use this device to assess?

1. _____
2. _____
3. _____

What units of measure does this device use?

Test:_____Units of Msrmnt.:_____Test:_____Units of Msrmnt.: _____

Test:_____Units of Msrmnt.:_____Test:_____Units of Msrmnt.: _____

Describe the 5 basic steps for starting to work with this instrument.

1. _____

_____

2. _____

_____

3. _____

_____

4. _____

_____

5. _____

_____

What are two <u>advantages</u> to using this device for home assessment work?

1. _____
2. _____

What are two <u>limitations</u> to using this device for home assessment work?

1. _____

2. _____

When is it appropriate to use this instrument?

_____

_____

_____

2. Instrument Name:_____Brand:_____Type: _____

What is the purpose of this instrument?

To Measure: _____

What hazards do you use this device to assess?

1. _____

2. _____

3. _____

What units of measure does this device use?

Test:_____Units of Msrmnt.:_____Test:_____Units of Msrmnt.: _____

Test:_____Units of Msrmnt.:_____Test:_____Units of Msrmnt.: _____

Describe the 5 basic steps for starting to work with this instrument.

1. _____

_____

2. _____

_____

3. _____

_____

4. _____

_____

5. _____

_____

What are two <u>advantages</u> to using this device for home assessment work?

1. _____

2. _____

What are two <u>limitations</u> to using this device for home assessment work?

1. _____

2. _____

When is it appropriate to use this instrument?

_____

_____

_____

3. Instrument Name:_____Brand:_____Type: _____

What is the purpose of this instrument?

To Measure: _____

What hazards do you use this device to assess?

1. _____

2. _____

3. _____

What units of measure does this device use?

Test:_____Units of Msrmnt.:_____Test:_____Units of Msrmnt.: _____

Test:_____Units of Msrmnt.:_____Test:_____Units of Msrmnt.: _____

Describe the 5 basic steps for starting to work with this instrument.

1. _____

_____

2. _____

_____

3. _____

_____

4. _____

_____

5. _____

_____

What are two <u>advantages</u> to using this device for home assessment work?

1. _____

2. _____

What are two <u>limitations</u> to using this device for home assessment work?

1. _____

2. _____

When is it appropriate to use this instrument?

_____

_____

_____

4. Instrument Name:_____Brand:_____Type: _____

What is the purpose of this instrument?

To Measure: _____

What hazards do you use this device to assess?

1. _____
2. _____
3. _____

What units of measure does this device use?

Test:_____Units of Msrmnt.:_____Test:_____Units of Msrmnt.: _____

Test:_____Units of Msrmnt.:_____Test:_____Units of Msrmnt.: _____

Describe the 5 basic steps for starting to work with this instrument.

1. _____
_____
2. _____
_____
3. _____
_____
4. _____
_____
5. _____
_____

What are two <u>advantages</u> to using this device for home assessment work?

1. _____
2. _____

What are two <u>limitations</u> to using this device for home assessment work?

1. _____

2. _____

When is it appropriate to use this instrument?

_____

_____

_____

5. Instrument Name:_____Brand:_____Type: _____

What is the purpose of this instrument?

To Measure: _____

What hazards do you use this device to assess?

1. _____

2. _____

3. _____

What units of measure does this device use?

Test:_____Units of Msrmnt.:_____Test:_____Units of Msrmnt.: _____

Test:_____Units of Msrmnt.:_____Test:_____Units of Msrmnt.: _____

Describe the 5 basic steps for starting to work with this instrument.

1. _____

_____

2. _____

_____

3. _____

_____

4. _____

_____

5. _____

_____

What are two <u>advantages</u> to using this device for home assessment work?

1. _____
2. _____

What are two <u>limitations</u> to using this device for home assessment work?

1. _____
2. _____

When is it appropriate to use this instrument?

_____

_____

_____

6. Instrument Name:_____Brand:_____Type: _____

What is the purpose of this instrument?

To Measure: _____

What hazards do you use this device to assess?

1. _____
2. _____
3. _____

What units of measure does this device use?

Test:_____Units of Msrmnt.:_____Test:_____Units of Msrmnt.: _____

Test:_____Units of Msrmnt.:_____Test:_____Units of Msrmnt.: _____

Describe the 5 basic steps for starting to work with this instrument.

1. _____

_____

2. _____

_____

3. _____

_____

4. _____

_____

5. _____

_____

What are two <u>advantages</u> to using this device for home assessment work?

1. _____

2. _____

What are two <u>limitations</u> to using this device for home assessment work?

1. _____

2. _____

When is it appropriate to use this instrument?

_____

_____

_____

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001659480

Phoenix, AZ: 1501 W. Knudsen Drive, Phoenix, AZ 85027 * (800) 651-4802

Account No.	1370772	Page ___ of ___	
Company:	Respircare Analytical Network	Sample COC	
Address:	20895 N. 69th Drive		
City, State, Zip:	Glendale, AZ 85308		
Contact:	Mike Buettner	Sampling Date/Time: 1/11/17	
Phone:	623-444-2240	Project Zip Code:	
Fax:		Project ID:	
E-mail:	mike@respircareanalytical.com	Project Description:	
Results:	Email Fax	PO Number:	
Special Instructions:			

Sample Type Codes

A - Air B - Bulk D - Dust S - Swab T - Tape
W - Water WC - WallChek Other_____

Turn Around Time Codes - (TAT)*

STD - Standard (DEFAULT)
RespirCare Default is Next Business Day
SD - Same Business Day Rush
WH - Weekend/Holiday

* Rushes received after 2pm or on weekends, will be considered received the next business day. Please alert us in advance of weekend analysis needs.

Sample Information

#	Sample Identification / Description	Type	TAT	Volume / Area	Spore Trap Analysis	Quantitative Direct Exam	ERMI	Allergen Screen	Spore Trap - Other Biologicals	Dust Characterization	Quantitray - sewage	E. coli/Coliforms - P/A			
1	Outside Baseline 5052	A	STD	452	✓										
2	Suspect Area 5399	A	Std	452	✓										
3	Baseboard & southwall	S	Std	comp		✓									
	Suspect microbial Growth in Converted garage & Baseboard And southwall of Laundry Room appears to be caused by Irrigation														

Analyses Requested**

Other Information - Check any that apply

✓	Initial Inspection
	POST-Remediation
✓	H2O Damage
	H2O Staining

Additional Information

Suspect growth in converted Garage

WEATHER

			Fog	Rain	Snow	Wind	Clear
RH	38	None	✓	✓	✓		
Temp	69F	Light					
		Moderate					
		Heavy					

LEVEL

Date	Time	Samples Relinquished By	Samples Received By
1/11/17	252		2:58

Environmental Health Assessment
Site Sampling Record for Laboratory Samples
Chain of Custody

Proj. #: _____

Contact: _____

Contact Address: _____

Client Address: _____

Site Address: _____

Phone #s: (O) - (F) -

FOR LAB USE ONLY

Lab Batch ID #: _____

Samples Logged In: _____

Date: _____

Due Date: _____

Investigator's Name(s): _____ Sampling Date: _____

Instructions / Special Requirements:

OnSite Measurement

IAQ-Calc ID#:

10760 / 10767

CO Instr. ID#:

MR-9513 / AIM450

Indoor Air Sampling and Measurement

Fungal Air Sampling Allergenco ID#(s):

FA Sample ID#	Slide ID	Trace ID	Sample Time	Sample Location	OS Sample ID#	FAS Lab ID#

Surface Sampling

Sample ID#	Surface Matrix	Sample Location and Description	Approx. Rep. Area (sq ft)	Lab ID#

Allergen Vacuum Sample

Sample ID#	Sample Media	Area Sampled (sq ft)	Sample Location and Description	Approx. Rep. Area (sq ft)	Lab ID#

Samples Relenquished by	Date/ Time	Accepted By	Date / Time

Environmental Health Program- Environmental Health Survey
Instrument Calibration & Check Form

Operator's Name(s): _____ Date: _____

Barometric Pressure: _____

Instrument / ID #:	Parameter	Zero Chk	Chk Std Conc.	Measured Value	% Rec.	Accept. Range	P / F	Comments	Operator Init.
Extech HD-500 Thermohygrometer w/ IR Thermometer									
ID #	Temp.	NA	Ref-			+/- 1*F			
	RH	NA	Ref-			+/- 3%			
ID #	Temp.	NA	Ref-			+/- 1*F			
	RH	NA	Ref-			+/- 3%			
***Compared to NIST certified thermohygrometer									
CO Detectors									
Gas Alert Extreme	CO		35 ppm	ppm		31.5 - 38.5			
Gas Alert Extreme	CO		35 ppm	ppm		31.5 - 38.5			
***Calibrate instrument using "Zero Air" and CO at 35 ppm									
Combustible Gas Detectors									
ID #	LEL		spike with LEL						
ID #	LEL		spike with LEL						
***Response occurs when exposed to any combustible gas (50% LEL span gas)									
Tramex or Protimeter Moisture Meter									
ID #	% Moisture		100%						
***Response measured when placed against one's hand									
Dragon Puffer Vapor Generator									
ID #	% Moisture		100%						
***Response measured when placed against one's hand									
Multi-Gas Detector (circle which one was calibrated)									
ID #	CO		35 ppm	ppm		31.5 - 38.5			
	TVOC		10.0* ppm	ppm		9.0 - 11.0			
	NO2		5.0 ppm	ppm		4.5 - 5.5			
	LEL		50%	%		45 - 55			

Laser Particle Counter

Instrument / ID #:	Parameter	Zero Chk	P / F	Comments	Operator Init.
ID #	Fn Ptcl				
ID #	Fn Ptcl				

Air Samplers

Instrument / ID #:	Target Flow L / min.	Flow Rate L / min	Accept. Range	P / F	Comments	Operator Init.
Fungal Air Samplers						
ID #	15.0		13.5 - 16.5			
ID #	15.0		13.5 - 16.5			
Hygiene Sampling Pumps						
ID #	0.20		0.18 - 0.22			
ID #	0.20		0.18 - 0.22			
Viable Sampling Pumps						
ID #	15.0		13.5 - 16.5			
ID #	15.0		13.5 - 16.5			

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HOSPITALS & CLINICS
www.childrens-mercy.org

Instrument Maintenance Activity Log

Red

Date	Instrument	Description of Activity	Instrument Status	Initials
10/5/05	Multi-Rae	Yearly Cleaning & Calibration	OK	LG
		Repaired VOC Amplifier		
10/11/05	IAQ 10760	Replaced Batteries	OK	LG
	IAQ 10767	Replaced Batteries	OK	LG
10/11/05	Multi-Rae	Re-Activated VOC Log	OK	LG/KK
		* Multi Rae Was Not Saving VOC Readings		
10/18/05	Multi-Rae	Replaced Old PID Lamp	OK	LG/KK
		* Was Not Working → Caused Span Gas Error		
12/30/05	RKI-Eagle	Got Back from OHA (Yearly Maintenance & Calibration	OK	LG
		2006		
8/29/06	IAQ 10767	Sent To TSI For Maintenance & Factory Calibration		LG
9/1/06	HHRC-6 10723	Sent To Factory For Maintenance & Calibration		LG
9/1/06	Allegiance Charging Unit	Sent To EMS For Repairs		LG
9/6/06	Multi-Rae	Replaced NO_2, CO, & LEL Detectors And PID Lamp		LG
9/7/06	P-Trak	Received Unit Back After TSI Factory Cal & Maintenance	OK	LG
9/8/06	Vacuum 3	Dropped Off At OHA - Bushings Sparking & Excessive Heat		LG
		↳		
9/11/06	Vacuum 1 & Vacuum 3	Drilled Holes In Side of Unit To Help Exhaust		
		Hot Air That Builds Up (Vacuum 1 Has "Touchy Plug"		LG
9/12/06	Allegiance 10730	Received Back From EMS - Factory Cal & Repairs		LG
	Allegiance 10732	Received Back From EMS - Factory Cal & Repairs		LG
	Charging Unit 10732	Repaired Charging Unit		LG
	Charging Unit Blue Tape 1	Repaired Charging Unit		LG
10/3/06	Multi-Rae	Installed New Firmware 3.12D-B		LG
		Re-Seated NO_2 Sensor (Still Reading ~ 1.5 ppm)		LG
10/16/06	IAQ 10767	Received Back From Factory		LG
10/4/06	Multi-Rae	Dropped Off At OHA → Sent Back To Rae		LG
		↳ NO_2 Sensor Affected By Humidity		LG
		↳ Rae Sent Back With Humidity		
		Reducing Sorbent Tubes That Need		
		To Be Used Externally		
10/13/06	Multi-Rae	Received Back From Rae		LG

GasAlertExtreme data file

General Comments

Datalogged CO from Smith Home 10/2 - 10/8/09

Date + Time	Serial Number	Gas Type	Reading (ppm/%vol)	STEL (ppm)	TWA (ppm)	Sensor Status	Unit Status	Pass Protect	STEL Period
10/2/2009 7:01:18	J409-M002731	CO	8	0	0	TWA Alarm Setpoint		No	15
10/2/2009 7:01:18	J409-M002731	CO	35	0	0	STEL Alarm Setpoint		No	15
10/2/2009 7:01:18	J409-M002731	CO	10	0	0	Low Alarm Setpoint		No	15
10/2/2009 7:01:18	J409-M002731	CO	35	0	0	High Alarm Setpoint		No	15
10/2/2009 7:01:18	J409-M002731	CO	0	0	0		Calibration Due	No	15
10/2/2009 7:01:18	J409-M002731	CO	88	0	0		Last calibration	No	15
10/2/2009 7:05:08	J409-M002731	CO	0	0	0	Auto-zeroing		No	15
10/2/2009 7:05:13	J409-M002731	CO	0	0	0	Calibrating		No	15
10/2/2009 7:05:18	J409-M002731	CO	0	0	0	Calibrating		No	15
10/2/2009 7:05:23	J409-M002731	CO	0	0	0	Calibrating		No	15
10/2/2009 7:05:28	J409-M002731	CO	0	0	0	Calibrating		No	15
10/2/2009 7:05:33	J409-M002731	CO	0	0	0	Calibrating		No	15
10/2/2009 7:05:38	J409-M002731	CO	26	0	0	Calibrating		No	15
10/2/2009 7:05:43	J409-M002731	CO	33	0	0	Calibrating		No	15
10/2/2009 7:05:48	J409-M002731	CO	34	0	0	Calibrating		No	15
10/2/2009 7:05:53	J409-M002731	CO	34	0	0	Calibrating		No	15
10/2/2009 7:05:58	J409-M002731	CO	34	0	0	Calibrating		No	15
10/2/2009 7:06:03	J409-M002731	CO	34	0	0	Calibrating		No	15
10/2/2009 7:06:08	J409-M002731	CO	32	0	0	Calibrating		No	15
10/2/2009 7:06:13	J409-M002731	CO	33	0	0	Calibrating		No	15
10/2/2009 7:06:18	J409-M002731	CO	33	0	0	Calibrating		No	15
10/2/2009 7:06:23	J409-M002731	CO	33	0	0	Calibrating		No	15
10/2/2009 7:06:28	J409-M002731	CO	33	0	0	Calibrating		No	15
10/2/2009 7:06:33	J409-M002731	CO	33	0	0	Calibrating		No	15
10/2/2009 7:06:38	J409-M002731	CO	35	0	0	Calibrating		No	15
10/2/2009 7:06:43	J409-M002731	CO	35	0	0	Calibrating		No	15
10/2/2009 7:06:48	J409-M002731	CO	35	0	0	Calibrating		No	15
10/2/2009 7:06:53	J409-M002731	CO	35	0	0	Calibrating		No	15
10/2/2009 7:06:58	J409-M002731	CO	35	0	0	Calibrating		No	15
10/2/2009 7:07:03	J409-M002731	CO	35	0	0	Calibrating		No	15
10/2/2009 7:07:08	J409-M002731	CO	35	0	0	Calibrating		No	15
10/2/2009 7:07:13	J409-M002731	CO	35	0	0	Calibrating		No	15
10/2/2009 7:07:18	J409-M002731	CO	35	0	0	Calibrating		No	15
10/2/2009 7:07:23	J409-M002731	CO	35	0	0	Calibrating		No	15
10/2/2009 7:07:28	J409-M002731	CO	35	0	0	Calibrating		No	15
10/2/2009 7:07:33	J409-M002731	CO	35	0	0	Calibrating		No	15
10/2/2009 7:08:34	J409-M002731	CO	35	0	0			No	15

GasAlertExtreme data file

General Comments

Datalogged CO from Smith Home 10/2 - 10/8/09

10/2/2009 7:12:14	J409-M002731	CO	0	0.2	0		Options menu	No	15

CO sensor with datalog placed in home at 10:20 a.m. on Friday 10/2/09

10/2/2009 21:34:23	J409-M002731	CO	3	0	0			No	15
10/2/2009 21:51:23	J409-M002731	CO	3	0	0.0			No	15
10/2/2009 22:14:23	J409-M002731	CO	3	0	0.0			No	15
10/2/2009 22:23:23	J409-M002731	CO	3	0.0	0.0			No	15
10/2/2009 22:40:23	J409-M002731	CO	3	0	0.0			No	15
10/2/2009 22:51:23	J409-M002731	CO	3	0.0	0.0			No	15
10/2/2009 22:52:23	J409-M002731	CO	3	0.0	0.0			No	15
10/2/2009 23:06:24	J409-M002731	CO	3	0.0	0.0			No	15
10/2/2009 23:09:24	J409-M002731	CO	3	0.0	0.0			No	15
10/2/2009 23:10:24	J409-M002731	CO	3	0.0	0.0			No	15
10/2/2009 23:16:24	J409-M002731	CO	3	0.1	0.0			No	15
10/2/2009 23:21:24	J409-M002731	CO	3	0.1	0.0			No	15
10/2/2009 23:29:24	J409-M002731	CO	3	0.0	0.0			No	15
10/2/2009 23:44:24	J409-M002731	CO	3	0.0	0.0			No	15
10/2/2009 23:46:24	J409-M002731	CO	3	0.0	0.0			No	15
10/2/2009 23:48:24	J409-M002731	CO	3	0.0	0.0			No	15
10/2/2009 23:51:24	J409-M002731	CO	3	0.1	0.0			No	15
10/2/2009 23:54:24	J409-M002731	CO	3	0.1	0.0			No	15
10/3/2009 0:00:24	J409-M002731	CO	3	0.1	0.0			No	15
10/3/2009 0:04:24	J409-M002731	CO	3	0.1	0.0			No	15
10/3/2009 0:06:24	J409-M002731	CO	3	0.1	0.0			No	15
10/3/2009 0:11:24	J409-M002731	CO	3	0.1	0.0			No	15
10/3/2009 0:12:24	J409-M002731	CO	3	0.1	0.0			No	15
10/3/2009 0:18:24	J409-M002731	CO	3	0.1	0.0			No	15
10/3/2009 0:24:24	J409-M002731	CO	3	0.1	0.0			No	15
10/3/2009 0:28:24	J409-M002731	CO	3	0.0	0.0			No	15
10/3/2009 0:29:24	J409-M002731	CO	3	0.1	0.0			No	15
10/3/2009 0:33:24	J409-M002731	CO	3	0.1	0.0			No	15
10/3/2009 0:34:24	J409-M002731	CO	3	0.1	0.0			No	15
10/3/2009 0:35:24	J409-M002731	CO	3	0.1	0.0			No	15
10/3/2009 0:36:24	J409-M002731	CO	3	0.1	0.0			No	15
10/3/2009 0:44:24	J409-M002731	CO	3	0.1	0.0			No	15
10/3/2009 0:45:24	J409-M002731	CO	3	0.1	0.0			No	15
10/3/2009 0:49:24	J409-M002731	CO	3	0.1	0.0			No	15
10/3/2009 0:50:24	J409-M002731	CO	3	0.1	0.0			No	15
10/3/2009 0:56:24	J409-M002731	CO	3	0.1	0.0			No	15
10/3/2009 0:57:24	J409-M002731	CO	3	0.1	0.0			No	15

Model Number:		7545			
Serial Number:	T75451243004				
Test ID:		59			
Test Abbreviation:	Test 059				
Start Date:					
Start Time:		10:50:37			
Duration (dd:hh:mm	0:00:02:05				
Log Interval (mm:ss)		0:01			
Number of points:		4			
Notes:	Test 059				
OUTSIDE START					
Statistics	Channel:		DewPoint T	T	H
	Units:		deg F	deg F	%rh
	Average:		**55.4**	**77.1**	**47.2**
	Minimum:		52.2	75.2	44.7
	Time of Minimum:		10:50:38	10:50:55	10:52:42
	Date of Minimum:				
	Maximum:		58.9	80	48.7
	Time of Maximum:		10:50:48	10:52:42	10:50:48
	Date of Maximum:				
Calibration	Meter:				
Calibration	Sensor:				
	Cal. Date				
Date	Time		DewPoint T	T	H
MM/dd/yyyy	hh:mm:ss		deg F	deg F	%rh
		10:50:38	55.5	76.8	47.8
		10:50:48	55.6	76.3	48.7
		10:50:55	55.1	75.2	47.8
		10:52:42	56.6	80	44.7
Model Number:		7545			
Serial Number:	T75451243004				
Test ID:		60			
Test Abbreviation:	Test 060				
Start Date:					
Start Time:		11:02:35			
Duration (dd:hh:mm	0:00:00:20				
Log Interval (mm:ss)		0:01			
Number of points:		3			
Notes:	Test 060				
CHILDS BEDROOM					
Statistics	Channel:		DewPoint T	T	H
	Units:		deg F	deg F	%rh
	Average:		**58.7**	**74.9**	**57**
	Minimum:		58.5	74.8	56.8

	Time of Minimum:	11:02:36	11:02:50	11:02:50
	Date of Minimum:			
	Maximum:	58.8	75	57.2
	Time of Maximum:	11:02:55	11:02:36	11:02:55
	Date of Maximum:			

Calibration	Meter:	
Calibration	Sensor:	
	Cal. Date	

Date	Time	DewPoint T	T	H
MM/dd/yyyy	hh:mm:ss	deg F	deg F	%rh
	11:02:36	58.7	75	56.9
	11:02:50	58.5	74.8	56.8
	11:02:55	58.8	75	57.2

Model Number:	7545
Serial Number:	T75451243004
Test ID:	61
Test Abbreviation:	Test 061
Start Date:	
Start Time:	11:03:46
Duration (dd:hh:mm	0:00:00:15
Log Interval (mm:ss)	0:01
Number of points:	3
Notes:	Test 061

BATHROOM

Statistics	Channel:	DewPoint T	T	H
	Units:	deg F	deg F	%rh
	Average:	**59.2**	**74**	**60**
	Minimum:	59.0	74.3	58.9
	Time of Minimum:	11:03:47	11:03:47	11:03:54
	Date of Minimum:			
	Maximum:	59.4	74.6	59.1
	Time of Maximum:	11:03:54	11:03:54	11:04:01
	Date of Maximum:			

Calibration	Meter:	
Calibration	Sensor:	
	Cal. Date	

Date	Time	DewPoint T	T	H
MM/dd/yyyy	hh:mm:ss	deg F	deg F	%rh
	11:03:47	59.1	74.3	59
	11:03:54	59.3	74.6	58.9
	11:04:01	59.2	74.4	59.1
	11:05:14	59.9	74.4	60.6
	11:05:20	60.0	74.4	60.8
	11:05:27	60.1	74.4	61

Model Number:	7545
Serial Number:	T75451243004
Test ID:	63
Test Abbreviation:	Test 063
Start Date:	
Start Time:	11:13:26
Duration (dd:hh:mm	0:00:00:13
Log Interval (mm:ss)	0:01
Number of points:	3
Notes:	Test 063

LIVING ROOM

Statistics	Channel:	DewPoint T	T	H
	Units:	deg F	deg F	%rh
	Average:	**59.8**	**74.3**	**60.5**
	Minimum:	59.7	74.3	60.4
	Time of Minimum:	11:13:39	11:13:33	11:13:27
	Date of Minimum:			
	Maximum:	59.8	74.3	60.5
	Time of Maximum:	11:13:27	11:13:27	11:13:39
	Date of Maximum:			

Calibration	Meter:	
Calibration	Sensor:	
	Cal. Date	

Date	Time	DewPoint T	T	H
MM/dd/yyyy	hh:mm:ss	deg F	deg F	%rh
	11:13:27	59.7	74.3	60.4
	11:13:33	59.8	74.3	60.5
	11:13:39	59.8	74.3	60.5

Model Number:	7545
Serial Number:	T75451243004
Test ID:	64
Test Abbreviation:	Test 064
Start Date:	
Start Time:	11:26:19
Duration (dd:hh:mm	0:00:00:13
Log Interval (mm:ss)	0:01
Number of points:	3
Notes:	Test 064

KITCHEN

Statistics	Channel:	DewPoint T	T	H
	Units:	deg F	deg F	%rh
	Average:	**60.8**	**74.1**	**63.2**
	Minimum:	60.8	74.1	63.1
	Time of Minimum:	11:26:20	11:26:32	11:26:32
	Date of Minimum:			

	Maximum:	2108	74.1	63.2
	Time of Maximum:	11:26:26	11:26:20	11:26:26
	Date of Maximum:			

Calibration	Meter:	
Calibration	Sensor:	
	Cal. Date	

Date	Time	DewPoint T	T	H
MM/dd/yyyy	hh:mm:ss	deg F	deg F	%rh
	11:26:20	60.8	74.1	63.2
	11:26:26	60.8	74.1	63.2
	11:26:32	60.8	74.1	63.1

Model Number:	7545
Serial Number:	T75451243004
Test ID:	65
Test Abbreviation:	Test 065
Start Date:	
Start Time:	11:39:37
Duration (dd:hh:mm	0:00:00:13
Log Interval (mm:ss)	0:01
Number of points:	3
Notes:	Test 065

OUTSIDE FINAL

Statistics	Channel:	DewPoint T	T	H
	Units:	deg F	deg F	%rh
	Average:	**57.2**	**75.6**	**52.9**
	Minimum:	56.6	75.4	52
	Time of Minimum:	11:39:44	11:39:44	11:39:44
	Date of Minimum:			
	Maximum:	57.9	75.9	53.6
	Time of Maximum:	11:39:38	11:39:50	11:39:50
	Date of Maximum:			

Calibration	Meter:	
Calibration	Sensor:	
	Cal. Date	

Date	Time	DewPoint T	T	H
MM/dd/yyyy	hh:mm:ss	deg F	deg F	%rh
	11:39:38	57.2	75.5	53
	11:39:44	56.6	75.4	52
	11:39:50	57.9	75.9	53.6

OUTSIDE AVG	**56.2**	**76.4**	**49.7**

Environmental Allergen Laboratory

Analysis for Environmental Allergens by Immunoassay

Dust Sample Report

Contact: _____ **Batch ID#:**

Site Address: _____

Client Sample ID: _____

Sample Description and Location:
CHILD'S BEDROOM FLOOR

Lab Sample ID: _____ VO2

Sampling Date: _____ Date of Analysis: _____ Sampling Method: _____

Sample Type: **Grab** Sample Area (sq. ft.): **9.0**

Allergen		MDL (ug/g)	Low	Medium	High
Cat	0.32	0.01	<0.5	0.5 - 1.5	>1.5
Dog	1.21	0.01	<0.5	0.5 - 2.5	>2.5
Rodent	0.01	0.01	<0.3	0.3 - 1.0	>1.0
Dust Mite	0.09	0.01	<0.5	0.5 - 1.5	>1.5
Cockroach	0.13	0.01	<0.3	0.3 - 1.3	>1.3

MDL = Method Detection Limit

Analyst Signature: _____ Date: _____ QC Review Chk: _____

Method of Analysis: Std. Method Instrument: Immunoassay

Dust samples:
Dust should be collected with a vacuum and frozen as soon as possible after collection. Dust samples including any loose material are separated by size through a 50 mesh (300 um) brass screen to remove gross debris. Samples yielding at least 500 mg of sieved material are preferred. Sieved dust is extracted in PBS and extracted for 3 hours at Immunology Consultants Laboratory. Extracts were stored at -20oC until analysis 19 18.

The dust is analyzed for antigens from 9 biological sources including fungal antigens specific to Alternaria alternata, Cladosporium herbarum and Aspergilus fumigatus. Also, antigens from Dermatophagoides farinae, Canis famalaris, Felis domesticus, Mus Muscalaris and Periplataria americana are determined bymonoclonal antibody assay. These assays were purchased from InBio Lagoratoruies or developed in our laboratory using materials from Greer Laboratories, Lenoir, NC.

Batch ID#: _____

Contact: _____ Site Address: _____

Sampling Date: _____ Date of Analysis: _____ Sampling Method: TAPELIFT

Client Sample ID:	**S01**	**S02**		
Sample Location:	Bathroom - Tub	Basement - Sheetrock wall near Furnace		
Lab Sample ID:	**3384(EHS201203)**	**3384(EHS201203)**		

Fungal Spore Genera	Semi-Quantitative Scale (1-5) Scale	Scale		
Alternaria	R	3		
Arthinium	ND	ND		
Ascospores	ND	ND		
Aspergillus / Penicillium	ND	2		
Basidiospores	ND	ND		
Bipolaris/ Dreschleria	ND	ND		
Bispora	ND	ND		
Botrytis	ND	ND		
Cercospora	ND	ND		
Chaetomium	R	ND		
Cladosporium	1	ND		
Curvularia	R	ND		
Epicoccum	R	ND		
Helicomycete	ND	ND		
Nigrospora	ND	ND		
Oidium	ND	ND		
Periconia	ND	ND		
Peronospora	ND	ND		
Pithomyces	ND	ND		
Puccinia	ND	ND		
Peronospora	ND	ND		
Smuts/Myxomycetes	1	ND		
Sordaria	ND	ND		
Spegazzinia	ND	ND		
Stachybotrys	1	5		
Stemphillium	ND	ND		
Tetraploa	ND	ND		
Torula	ND	ND		
Ulocladium	ND	ND		
Unique Fungi Identified				
Rusts	R	ND		
Pollen	R	ND		
Hyphal Fragments	R	3		
Mites	ND	ND		
Yeast	ND	ND		

ND = Not detected, or below the observable limit of detection.

Analyst Signature: _____ Date: _____ QC Review Chk: _____

Method of Analysis: Light Microscopy Microscope Used: _____ Microscope ID: P1

CMH Light Microscopy Visible Spore Count Scale

R = Rare, (1-5 Spores per 50 High Power Fields (HPF) of view)
1 = Few, (6-10 Spores per 50 HPF)
2 = Moderate, (11-40 Spores per 50 HPF)
3 = Many, (41-100 Spores per 50 HPF)
4 = Heavy, (101-500 Spores per 50 HPF)
5 = Very Heavy, (>500 Spores per 50 HPF)

The results are shown using a semi-quantitative method developed by _____to show the level of population growth. A high power field is the observable area on a slide when the microscope is set a magnification of 1000X . These rankings will vary with the microscope used.

EMLab P&K
1501 West Knudsen Drive, Phoenix, AZ 85027
(800) 651-4802 Fax (623) 780-7695 www.emlab.com

Client:

Date of Sampling: 01-11-2017
Date of Receipt: 01-11-2017
Date of Report: 01-12-2017

QUANTITATIVE SPORE COUNT REPORT

Location:	3: Baseboard South Wall	
Comments (see below)	None	
Sample type	Swab sample	
Lab ID-Version‡:	7727208-1	
Analysis Date:	01/12/2017	
	raw ct.	spores/unit
Aureobasidium		
Basidiospores		
Bipolaris/Drechslera group		
Botrytis		
Chaetomium	66	2,100,000
Cladosporium		
Curvularia		
Epicoccum		
Fusarium		
Myrothecium		
Nigrospora		
Other colorless		
Penicillium/Aspergillus types†	3	94,000
Pithomyces		
Rusts		
Smuts, Periconia, Myxomycetes		
Stachybotrys		
Stemphylium		
Torula		
Ulocladium		
Zygomycetes		
brown spore type, ID unknown	85	2,700,000
Background debris (1-4+)††	1+	
Sample size	1	
Unit	1 swab	
Hyphal fragments/unit	410,000	
§ TOTAL SPORES/UNIT		4,800,000

Comments:

† The spores of *Aspergillus* and *Penicillium* (and others such as *Acremonium*, *Paecilomyces*) are small and round with very few distinguishing characteristics. They cannot be differentiated by non viable sampling methods. Also, some species with very small spores are easily missed, and may be undercounted.
†† Background debris is an indication of the amount of non-biological particulate matter present on the slide (dust in the air) and is graded from 1+ to 4+ with 4+ indicating the largest amounts. This background material is also an indication of visibility for the analyst and resultant difficulty reading the slide. For example, high background debris may obscure the small spores such as the *Penicillium/Aspergillus* group. Counts from areas with 4+ background debris should be regarded as minimal counts and may actually be higher than reported.
‡ A "Version" indicated by -"x" after the Lab ID# with a value greater than 1 indicates a sample with amended data. The revision number is reflected by the value of "x".
§ Total Spores/unit has been rounded to two significant figures to reflect analytical precision.
The limit of detection is 1 spore per area analyzed.
The analytical sensitivity is (1 Spore/Total Number of Fields Observed)*(Total Sample Area(cm2)/Field Area of the microscope objective (cm2))*(1/unit volume)*Dilution Factor.
For more information regarding analytical sensitivity, please contact QA by calling the laboratory.

Spore types listed without a count or data entry were not detected during the course of the analysis for the respective sample, indicating a raw count of <1 spore.

iii. Mold Resources, United States Environmental Protection Agency. http://www.epa.gov/mold/moldresources.html
iv. Mold in My Home, What do I do? California Department of Health Services. www.asbestos.org/Microbial/index.html

Table 1: Summary of Specific Mold Characteristics

Fungi	Environmental Indicator		Typically Found
Alternaria			*Alternaria* is one of the more common fungi found in nature. It is found growing indoors on a variety of substrates including wallboards, painted walls, etc.
Arthrinium			*Arthrinium* is a saprobe and is found on plants. It is rarely found growing indoors.
Ascospores			Ascospores are ubiquitous in nature and are commonly found in the outdoor environment. Some fungi that belong to the ascomycete family include the sexual forms of *Penicillium/ Aspergillus*, *Chaetomium*, etc that may be frequently found growing on damp substrates.
Aureobasidium			*Aureobasidium* is commonly found in a variety of soils. Indoors, it is commonly found where moisture accumulates, especially bathrooms, and kitchens, on shower curtains, tile grout, windowsills, textiles, and liquid waste materials.
Basidiospores			Basidiospores are Saprophytes and plant pathogens and are commonly found in gardens, forests, and woodlands. They also include organisms that are the agent of "dry rot," and other fungi that cause white and brown wood rot, which may grow and destroy the structural wood of buildings.
Bipolaris/ Dreschlera			*Bipolaris* and *Dreschlera* are usually found associated with plant debris, and soil. They are plant pathogens of numerous plants, particularly grasses. *Bipolaris* and *Dreschlera* can grow indoors on a variety of substrates.
Botrytis			*Botrytis* is commonly found in tropical and temperate climates growing on vegetative matter. They may be found indoors in conjugation with indoor plants, fruits and vegetables.
Chaetomium			*Chaetomium* is often found on materials containing cellulose such as sheetrock paper, or other wet materials.
Cladosporium			*Cladosporium* is a common outdoor mold. They are commonly found on dead plants, food, textiles, and a variety of other surfaces. Indoors, they can grow on a variety of substrates including textiles, wood, moist windowsills, etc. It can grow at 0°C and is associated with refrigerated foods.
Curvularia			*Curvularia* is found on plant materials and is considered a saprobe. Indoors, they can grow on a variety of substrates.
Epicoccum			*Epicoccum* is a saprophyte and considered a weekly parasitic secondary invader of plants. They tend to colonize continuously damp materials such as damp wallboard and fabrics.
Fusarium			*Fusarium* requires very wet conditions and is frequently isolated from plants and grains. They colonize continuously damp materials such as damp wallboard and water reservoirs for humidifiers and drip pans.

Memnoniella			*Memnoniella* can be found growing on a variety of cellulose-containing materials.
Nigrospora			*Nigrospora* is especially abundant in warm climates and is rarely found growing indoors.
Oidium/ Peronospora			*Oidium* and *Peronospora* are plant pathogens and are not found growing indoors.
Penicillium/ Aspergillus			*Penicillium* and *Aspergillus* are ubiquitous in environment. *Aspergillus* tends to colonize continuously damp materials such as damp wallboard and fabrics. *Penicillium* is commonly found in house dusts, wallpaper, decaying fabrics, moist clipboards, etc.
Pithomyces/ Ulocladium			*Pithomyces* is commonly found on grass and decaying plant material and are rarely found growing indoors. *Ulocladium* has a high water requirement and therefore colonizes continuously damp materials such as damp wallboard and fabrics.
Rusts			Rusts are plant pathogens and only grow on host plants.
Smuts/ *Periconia*/ Myxomycetes			Smuts and Myxomycetes are parasitic plant pathogens that require a living host. Smuts do not usually grow indoors. *Periconia* are rarely found growing indoors. Myxomycetes are occasionally found indoors, but rarely growing.
Stachybotrys			*Stachybotrys* are commonly found indoors on wet materials containing cellulose, such as wallboard, jute, wicker, straw baskets, and other paper materials.
Stemphylium			*Stemphylium* is either parasitic or saprophytic and is rarely found growing indoors.
Torula			*Torula* can grow indoors on cellulose containing materials such as wallboard, jute, wicker, straw baskets, and other paper materials.
Other brown/ colorless			An uncharacteristic fungal spore that does not lend itself to classification via direct microscopy.

 Potential Water Intrusion/Indicator Mold

 Potential Water Intrusion/Indicator Mold Capable of Mycotoxin Production

Quality Programs

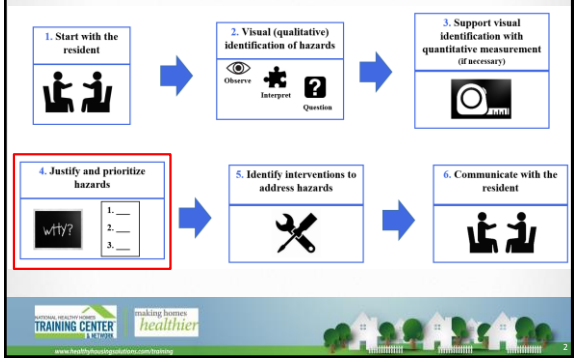
The EMLab P&K's laboratory network is staffed with highly trained analysts, the majority of which hold advanced degrees. The reliability of test results depends on many factors such as the personnel performing the tests, environmental conditions, selection and validation of test methods, equipment functioning, as well as the sampling, storage and handling of test items, all of which are a reflection of the overall quality system of the laboratory.

EMLab P&K has modeled its quality system after ISO 17025, General Requirements for the Competence of Testing and Calibration Laboratories, one of the most stringent sets of standards in the industry, to ensure that its customers receive the highest standard of accuracy, reliability, and impartiality that they have come to expect from the leader in the environmental industry. EMLab P&K's laboratories adherence to the standards set forth in ISO 17025 has been validated and formally recognized through accreditations granted by an independent outside agency, American Industrial Hygiene Association (AIHA), on a site by site basis. As an additional measure to demonstrate its competency to perform the analyses it offers to its clients, EMLab P&K laboratories

Module 5
Step 4: Justify and Prioritize Hazards

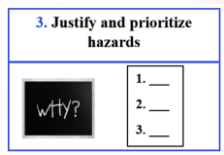
Healthy Housing Solutions Inc.

Key Steps



Key Steps

- Justifying why a hazard IS a hazard
- Reviewing prioritization
- Reviewing risk assessment
- Case study



Justification

JUSTIFICATION

Why is this a hazard?

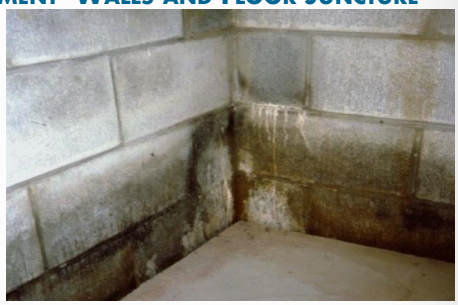
KITCHEN - APPLIANCES

Why is this a hazard?

Hazard: gas stove with no exhaust fan

Basement- Walls and Floor Juncture

Why is this a hazard?



Hazard: moisture in basement

Living Room – Window

Why is this a hazard?

Hazard: deteriorated lead-based paint

Prioritization

Prioritizing – Acute vs. Chronic

Acute: hazards that require immediate attention because they are an immediate threat to health or life.

Chronic – hazards which do not pose an immediate risk to health or life but do promote allergies, asthma, lead poisoning, pesticide exposure, or other chronic health conditions.

Other Prioritization Factors:

Identify what priority, if any, you would place on the issues or hazards observed:

- Prioritize acute over chronic?
- Lowest cost first?
- Easiest to Address First?
- Biggest health benefit, if known
- Fastest Health Benefit, if obvious

For more discussion see, "Healthy Habitats", Carl Grimes, HHS, CIEC, © 2002, Building Press.

A Review of Risk Assessment

Assessments should:

- Identify the nature and extent of individual hazards: **Risk Assessment**
- Determine the relative risk of different hazards: **Risk Analysis**
- Evaluate the interactions and synergisms between individual hazards: **Risk Characterization**

Source: HUD Healthy Homes Issues: Residential Assessments, March 2006

Risk Assessment

Risk Assessment is a systematic method of collecting and interpreting scientific information relating environmental hazards to human health.

Risk Assessment is a process of quantifying the likelihood of harmful effects from a hazard.

Risk assessment is NOT making medical statements or connections.

Risk Assessment in the Federal Government: Managing the Process", National Research Council, © 1983

Home Assessments are Risk Assessments

Risk Assessment Steps*

- Hazard Identification
- Hazard Evaluation
- Dose-response assessment
- Exposure Assessment
- Risk Characterization

**National Research Council, 1983*

EXPOSURE AS A FACTOR IN PRIORITIZATION

Risk = hazard x exposure

EXPOSURE AS A FACTOR IN PRIORITIZATION

Which animal is most likely to kill you?

THE ORLOV FAMILY CASE STUDY (PART 3)

- In small groups, review the pictures of the Orlov's family's house.
- Review the case study details if necessary
- Fill out the form for Orlov Case study part 3.
- Small groups report back to class.

Module 6
Personal Safety, Insurance, and Liability

Healthy Housing Solutions Inc.

This module covers:

1. Assessor safety
2. Occupant protection
3. Health advice vs. healthy homes advice
4. Liability principles

Assessor Safety

Personal protective equipment to consider:

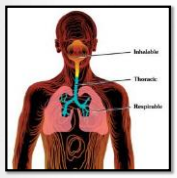
- Tyvek Coveralls
- Respirator
- Booties
- Gloves
- Safety Glasses
- Hard Hat

Can you add to this list?

Note- this discussion is about professionals who go into people's homes. Occupation-related personal protective equipment (PPE) is covered by OSHA with specific regulations regarding medical monitoring and guidance on worker protection.

Fine Particles

If a particle is less than 10 microns:	If a particle is smaller than 20 microns:	Most common airborne particle size is:	Most harmful particle size is less than:
You can breath it in.	You can't see it.	2.4 microns	1 micron



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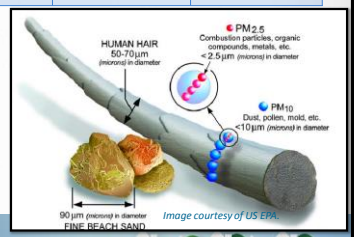


Image courtesy of US EPA.

Respirator Masks

NIOSH approved N-95 Respirator mask

Minimum protection for dust, mold or smoke particles

No protection from carbon monoxide or other toxic gases.

Note- this discussion is about professionals who go into people's homes. Occupation-related personal protective equipment (PPE) is covered by OSHA with specific regulations regarding medical monitoring and guidance on worker protection.

N-95 Respirator

Minimum protection if high concentrations of unknown particles are observed

Dust, mold, and smoke are made up of particles. First line of defense for protection is a NIOSH approved N-95 rated respirator.

Particle respirators do not provide any protection from carbon monoxide or other toxic gases!

Respirators are only a part of personal protective equipment (PPE).

Note- this discussion is about professionals who go into people's homes. Occupation-related personal protective equipment (PPE) is covered by OSHA with specific regulations regarding medical monitoring and guidance on worker protection.

Wear Respirators Properly

- Top strap goes high on the back of the head. Bottom strap around back of neck.
- Using **two hands**, mold the nose piece to the shape of your nose. Pinching with one hand usually will not work well enough to make a good seal.
- Positive pressure fit check. Cover the respirator with both hands and exhale. If air leaks around nose, adjust nose piece. If air leaks around edge, adjust straps by pulling back along head.
- Negative pressure fit check. Cover the respirator with both hands and inhale sharply. If necessary, adjust fit as described above.

Photos courtesy of Curtis Reddington, © 2012.

All Masks are Not the Same

Note- this discussion is about professionals who go into people's homes. Occupation-related personal protective equipment (PPE) is covered by OSHA with specific regulations regarding medical monitoring and guidance on worker protection.

Assessor Hazards & Precautions

Be aware of

- Significant structural defects and physical hazards
- Improperly stored and uncharacterized chemicals and pesticides
- Visible and significant biological Contamination
- Fire and improperly stored combustible materials

Can you ask for a hazard to be removed?

OCCUPANT PROTECTION

What Information is Confidential?

- Be aware of what information is "sensitive" to a resident.
- Public agency staff must be aware of federal and state laws related to personal information

Sharing Client Information

Understanding the Health Information Portability & Accountability Act, 1996 (HIPAA)

- Most, but not all, government agencies are HIPAA covered entities.
- Clients should sign a HIPAA Permission form.
- Is your organization a HIPAA-covered entity and do you use contractors/sub-grantees?
  - If yes and yes, then you should require a written HIPAA agreement with them. If you don't, the contractor/sub-grantee can share any information you provide and YOU are liable.
- Do not publish health and/or personal data on-line.

Sharing Client Information

Likely Sensitive

- Use of addictive products
- Illegal conduct
- Mental health
- Personal hygiene
- Medication
- Health conditions
- Symptoms
- Citizenship

Usually Not Sensitive

- Occupation
- Birth date/age
- Race/ethnicity
- Gender
- Organizational affiliation
- Home address

Child Protective Services

What if you see:

- Young children home alone?
- Active physical abuse, or evidence of abuse?
- Drug activity?
- Adults have to leave. You can stay, my teenagers are here.

Discretionary Reporting

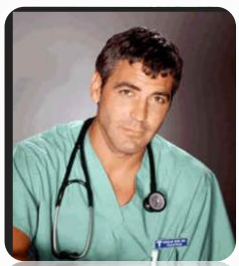
- **To whom do you report?**
- **What do you report?**
- **When?**

REPORT TO PROPERTY OWNER AND TENANT

No Smoke Alarms House does not have any smoke alarms.	**Pest Problem** There is an infestation of some type of pest.	**No Window Guards** No window guards in high rise building.
Serious Structural Defects Property has structural defects that may cause an injury.	**Deteriorated Paint** Peeling or deteriorated paint in homes older than 1978.	**Water Temp Too High** Hot water temperature is above 120 degrees F.
Sewage There is sewage intrusion in or very near.	**Sampling Results** If taken, provide results of lead and radon measurements.	**Immediate Threat** Any other immediate threat to health or life.

HEALTH ADVICE *VS* HEALTHY HOMES ADVICE

REMEMBER THIS SLIDE?



You're **STILL** not a real doctor . . . . .

What you Can and Cannot Say

Do not say: "Do [this intervention] and your child's [illness] will improve."

Do say: "I recommend [this intervention]. There is evidence, according to [source] that there is an association between [this intervention] and reduced symptoms."

Liability Principles

What is Your Liability?

During the assessment
- What are you responsible for?

When you draft a report
- What if you leave something out?

If you share information
- With another organization
- With a landlord
- With a former spouse

General liability insurance

professional errors and omissions insurance.

Umbrella policy

Liability

Auditors / Home Performance

Low / minimum

vs.

IAQ / Asbestos / Mold / Hazardous conditions

High / litigation industry

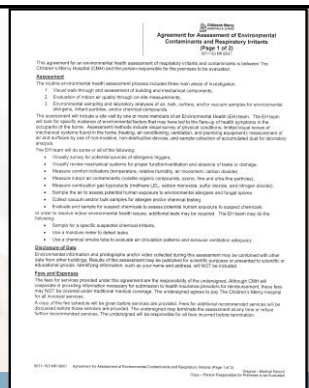
"They can't sue me, I don't inspect for these issues!

Hazardous Operating Procedure

If I or my employees suspects hazardous conditions, we will:

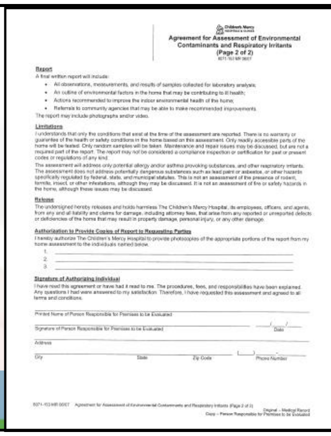
1. Consult the client
2. Provide X, Y & Z documents
3. Have it tested by or sent to X lab
4. Seek and or provide ongoing training

Sample Consent Form – First page



Agreement for Assessment of Environmental Contaminants and Respiratory Irritants
(Page 1 of 2)

Sample Consent Form – Second Page



Children's Mercy

Agreement for Assessment of Environmental Contaminants and Respiratory Irritants (Page 2 of 2)

Report

A final written report will include:

- All observations, measurements, and results of samples collected for laboratory analysis;
- An outline of environmental factors in the home that may be contributing to ill health;
- Actions recommended to improve the indoor environmental health of the home;
- Referrals to community agencies that may be able to make recommended improvements.

The report may include photographs and/or video.

Limitations

I understands that only the conditions that exist at the time of the assessment are reported. There is no warranty or guarantee of the health or safety conditions in the home based on this assessment. Only readily accessible parts of the home will be tested. Only random samples will be taken. Maintenance and repair issues may be discussed, but are not a required part of the report. The report may not be considered a compliance inspection or certification for past or present codes or regulations of any kind.

The assessment will address only potential allergy and/or asthma provoking substances, and other respiratory irritants. The assessment does not address potentially dangerous substances such as lead paint or asbestos, or other hazards specifically regulated by federal, state, and municipal statutes. This is not an assessment of the presence of rodent, termite, insect, or other infestations, although they may be discussed. It is not an assessment of fire or safety hazards in the home, although these issues may be discussed.

Release

The undersigned hereby releases and holds harmless The Children's Mercy Hospital, its employees, officers, and agents, from any and all liability and claims for damage, including attorney fees, that arise from any reported or unreported defects or deficiencies of the home that may result in property damage, personal injury, or any other damage.

Authorization to Provide Copies of Report to Requesting Parties

I hereby authorize The Children's Mercy Hospital to provide photocopies of the appropriate portions of the report from my home assessment to the individuals named below.

1. ______
2. ______
3. ______

Signature of Authorizing Individual

I have read this agreement or have had it read to me. The procedures, fees, and responsibilities have been explained. Any questions I had were answered to my satisfaction. Therefore, I have requested this assessment and agreed to all terms and conditions.

Printed Name of Person Responsible for Premises to be Evaluated

Signature of Person Responsible for Premises to be Evaluated ____ Date

Address

City State Zip Code Phone Number

6071-153 MR 0007 Agreement for Assessment of Environmental Contaminants and Respiratory Irritants (Page 2 of 2)

Original – Medical Record

Copy – Person Responsible for Premises to be Evaluated

25

"Rules of Thumb"

Legal issues and liability

- Follow laws
- Exercise caution when making recommendations for home treatments
- Recommend professionals when needed
- Use applicable standards when available

26

Liability Exposures

- **Healthy Homes Practitioners**
  - Multiple sources and types of exposures
  - Limited research and data
  - Lack of clear standards and guidelines
  - Testing methods and controls

27

Children's Mercy HOSPITALS & CLINICS

Agreement for Assessment of Environmental Contaminants and Respiratory Irritants (Page 1 of 2)

8071-153 MR 06/07

This agreement for an environmental health assessment of respiratory irritants and contaminants is between The Children's Mercy Hospital (CMH) and the person responsible for the premises to be evaluated.

Assessment

The routine environmental health assessment process includes three main areas of investigation:

1. Visual walk-through and assessment of building and mechanical components;
2. Evaluation of indoor air quality through on-site measurements;
3. Environmental sampling and laboratory analyses of air, bulk, surface, and/or vacuum samples for environmental allergens, irritant particles, and/or chemical compounds.

The assessment will include a site visit by one or more members of an Environmental Health (EH) team. The EH team will look for specific evidence of environmental factors that may have led to the flare-up of health symptoms in the occupants of the home. Assessment methods include visual survey of physical conditions; limited visual review of mechanical systems found in the home (heating, air conditioning, ventilation, and plumbing equipment); measurement of air and surfaces by use of non-invasive, non-destructive devices, and sample collection of accumulated dust for laboratory analysis.

The EH team will do some or all of the following:

- Visually survey for potential sources of allergenic triggers.
- Visually review mechanical systems for proper function/ventilation and absence of leaks or damage.
- Measure comfort indicators (temperature, relative humidity, air movement, carbon dioxide).
- Measure indoor air contaminants (volatile organic compounds, ozone, fine and ultra-fine particles).
- Measure combustion gas byproducts (methane LEL, carbon monoxide, sulfur dioxide, and nitrogen dioxide).
- Sample the air to assess potential human exposure to environmental allergens and fungal spores.
- Collect vacuum and/or bulk samples for allergen and/or chemical testing.
- Evaluate and sample for suspect chemicals to assess potential human exposure to suspect chemicals.

In order to resolve indoor environmental health issues, additional tests may be required. The EH team may do the following:

- Sample for a specific suspected chemical irritants.
- Use a moisture meter to detect leaks.
- Use a chemical smoke tube to evaluate air circulation patterns and exhause ventilation adequacy.

Disclosure of Data

Environmental information and photographs and/or video collected during this assessment may be combined with other data from other buildings. Results of this assessment may be published for scientific purposes or presented to scientific or educational groups. Identifying information, such as your name and address, will NOT be included.

Fees and Expenses

The fees for services provided under this agreement are the responsibility of the undersigned. Although CMH will cooperate in providing information necessary for submission to health insurance providers for reimbursement, these fees may NOT be covered under traditional medical coverage. The undersigned agrees to pay The Children's Mercy Hospital for all invoiced services.

A copy of the fee schedule will be given before services are provided. Fees for additional recommended services will be discussed before those services are provided. The undersigned may terminate the assessment at any time or refuse further recommended services. The undersigned will be responsible for all fees incurred before termination.

Original – Medical Record
Copy – Person Responsible for Premises to be Evaluated

Children's Mercy Hospital © 2010 Forms May Be Reproduced with Permission

Agreement for Assessment of Environmental Contaminants and Respiratory Irritants (Page 2 of 2)

8071-153 MR 06/07

Report

A final written report will include:

- All observations, measurements, and results of samples collected for laboratory analysis;
- An outline of environmental factors in the home that may be contributing to ill health;
- Actions recommended to improve the indoor environmental health of the home;
- Referrals to community agencies that may be able to make recommended improvements.

The report may include photographs and/or video.

Limitations

I understands that only the conditions that exist at the time of the assessment are reported. There is no warranty or guarantee of the health or safety conditions in the home based on this assessment. Only readily accessible parts of the home will be tested. Only random samples will be taken. Maintenance and repair issues may be discussed, but are not a required part of the report. The report may not be considered a compliance inspection or certification for past or present codes or regulations of any kind.

The assessment will address only potential allergy and/or asthma provoking substances, and other respiratory irritants. The assessment does not address potentially dangerous substances such as lead paint or asbestos, or other hazards specifically regulated by federal, state, and municipal statutes. This is not an assessment of the presence of rodent, termite, insect, or other infestations, although they may be discussed. It is not an assessment of fire or safety hazards in the home, although these issues may be discussed.

Release

The undersigned hereby releases and holds harmless The Children's Mercy Hospital, its employees, officers, and agents, from any and all liability and claims for damage, including attorney fees, that arise from any reported or unreported defects or deficiencies of the home that may result in property damage, personal injury, or any other damage.

Authorization to Provide Copies of Report to Requesting Parties

I hereby authorize The Children's Mercy Hospital to provide photocopies of the appropriate portions of the report from my home assessment to the individuals named below.

1. _____
2. _____
3. _____

Signature of Authorizing Individual

I have read this agreement or have had it read to me. The procedures, fees, and responsibilities have been explained. Any questions I had were answered to my satisfaction. Therefore, I have requested this assessment and agreed to all terms and conditions.

_____
Printed Name of Person Responsible for Premises to be Evaluated

_____ _____/_____/_____
Signature of Person Responsible for Premises to be Evaluated Date

_____
Address

_____ _____ _____ (_____) _____-_____
City State Zip Code Phone Number

Original – Medical Record
Copy – Person Responsible for Premises to be Evaluated

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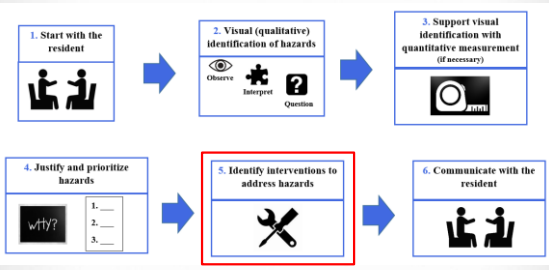
Module 7
Step 5: Identify Interventions to Address Hazards

Healthy Housing Solutions Inc.

Key Steps



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2

Key Steps

5. Identify interventions to address hazards

- Intervention resources
- Review of interventions by Keep it principle
  - Focus on Integrated Pest Management

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3

Health impacts of housing hazards in eight categories:

1. Moisture
2. Sanitation
3. Pests
4. Ventilation
5. Safety
6. Contaminants
7. Maintenance
8. Comfort

- 1. Dry
- 2. Clean
- 3. Pest-Free
- 4. Ventilated
- 5. Safe
- 6. Contaminant-Free
- 7. Maintained
- 8. Climate Controlled

Source of Resources & References

Promote evidence, not opinion

National Resources

CDC Centers for Disease Control and Prevention

U.S. Department of Housing and Urban Development

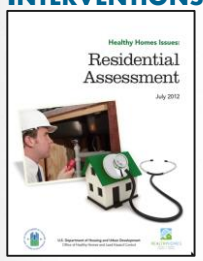
United States Environmental Protection Agency

USDA

Department of Health & Human Services

U.S. Public Health Service 1798

INTERVENTIONS

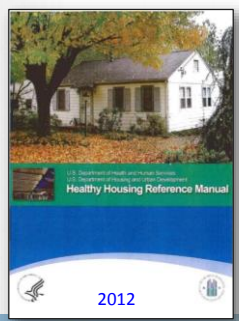


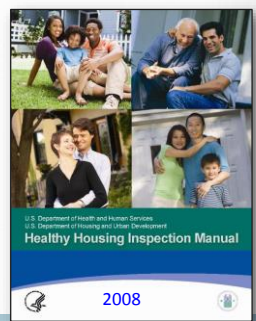
7

HEALTHY HOUSING MANUALS / RESOURCES

8

HEALTHY HOUSING MANUALS / RESOURCES





9

New EPA Home RX - The Health Benefits of Home Performance

Research and justification
- Health & Energy
- Health Outcomes
- Case studies

10

Test Methods and Protocols for Environmental and Safety Hazards Associated With Home Energy Retrofits

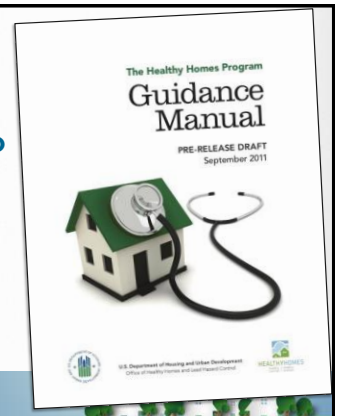
Testing
- Qualitative
- Quantitative
- Familiar tests related to health risk

11

A Guide for Healthy Home Program Development and Operations

Fully comprehensive guide
- Program overview
- Interview tools
- Diagnostic guidance

http://portal.hud.gov/hudportal/HUD?mode=disppage&id=HHGUIDANCEMANUAL



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HUD Healthy Home Intervention Priorities

Table 4.1 Priority List of Better Homes for Asthma (adapted from Seattle/King County Health Department)

- High priority items are indicated with an [A]
- Lower-priority items with [B] or [C].

Repair plumbing leaks [A]
Correct mold problems [A]
Clean evaporator pan under refrigerator [A]
Install range hoods that vent to exterior [A for gas; B for electric]
Repair dry floor drain traps if sewer gases detected [A]
Assure that at least one window in each room can open [A]
Remove basement, bath and kitchen wall to wall carpet [A]
Install smoke and carbon monoxide alarms [A]
Repair deteriorated bath and tub caulk [B or C]
Install pleated filter in forced-air heating system. [A]
In the crawl space, seal /cover soil with poly. [A]
Seal crawl space from house air. [A]

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The Healthy Homes Program Guidance Manual:

Interventions Related to Keep it Dry and Ventilated

Figure 5.2 Key Structural Controls for Moisture

1. Limit water entry (e.g., maintain gutter systems).
2. Dehumidify damp spaces such as basements.
3. Repair leaks and assure that drains work properly.
4. Clean or properly remove wet or moldy building components.
5. Manage ventilation systems so that moisture is removed at the source.

Figure 5.7 Ventilation Interventions

- Remove airborne contaminants through proper exhaust ventilation.
- Supply fresh air through dilution ventilation.
- Test for and conduct radon remediation as needed.

See Handout

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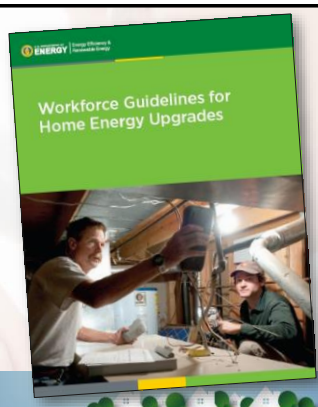
SWS- Helpful Guidance For Some Important Interventions



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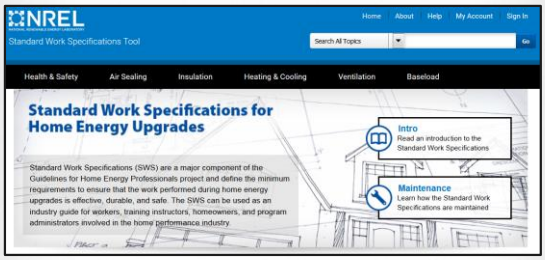
Intervention Resources



Health and Safety section https://sws.nrel.gov/spec/2

National Renewable Energy Laboratory: Standard Work Specifications Tool – Section 2 Health and Safety

Intervention Resources

ICC International Property Maintenance Code

SECTION 304
EXTERIOR STRUCTURE

304.1 General. The exterior of a structure shall be maintained in good repair, structurally sound and sanitary so as not to pose a threat to the public health, safety or welfare.

304.1.1 Unsafe conditions. The following conditions shall be determined as unsafe and shall be repaired or replaced to comply with the *International Building Code* or the *International Existing Building Code* as required for existing buildings:

1. The nominal strength of any structural member is exceeded by nominal loads, the load effects or the required strength;
2. The anchorage of the floor or roof to walls or columns, and of walls and columns to foundations is not capable of resisting all nominal loads or load effects;
3. Structures or components thereof that have reached their limit state;
4. Siding and masonry joints including joints between the building envelope and the perimeter of windows, doors and skylights are not maintained, weather resistant or water tight;

4. Siding and masonry joints including joints between the building envelope and the perimeter of windows, doors and skylights are not maintained, weather resistant or water tight;

Does this violate the IPMC?

Key Provisions of Codes

- Structural Integrity
- Weatherproof
- Maintenance
- Cracks & Holes
- Loose or Rotting Materials
- Dampness & Deterioration
- Peeling Paint
- Ventilation / Windows
- Infestation
- Sanitation & Trash
- Cleanability
- Clothes Dryer
- Space Heater

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Codes Related to Healthy Homes

- Health / Sanitation Codes
- Housing / Property Maintenance Codes
- Landlord-Tenant Laws
- Product Standards
- Hazard Management Laws

Housing v. Building v. Zoning Codes

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Landlord-Tenant Laws

Rights and Responsibilities

Common Requirements

- Certificate of Occupancy
- Duty to Pay Rent
- Withholding Rent to Make Repairs
- Retaliation

Eviction and Enforcement

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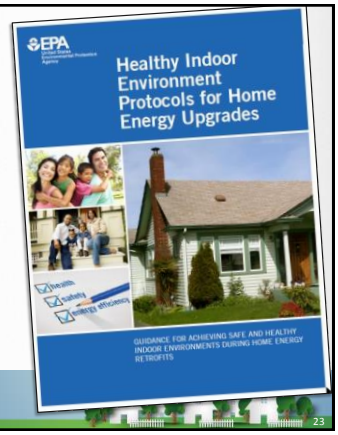
EPA Indoor Environmental Protocols for Energy Audits

Voluntary Guidelines Include:

- Protocols
- Minimum Actions
- Expanded Actions



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What to look for during the Home Energy Audit

ASSESSMENT PROTOCOL

HEA

Minimum Actions

ASSESSMENT PROTOCOLS

Measures to help home energy retrofit contractors identify common indoor air quality and safety concerns in homes. This document is not a guide to diagnosing occupant health problems or building-related illnesses.

Minimum Actions

Critical actions intended to ensure work does not potentially cause or worsen indoor air quality or safety problems for occupants or workers (i.e., "Do No Harm"). EPA recommends these protections for ALL retrofit projects.

Expanded Actions

Additional actions to promote healthy indoor environments that can be taken during energy-efficiency retrofit projects. EPA recommends considering these improvements when feasible.

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WHAT TO LOOK FOR DURING THE HOME ENERGY AUDIT

ASSESSMENT PROTOCOL | HEA

Minimum Actions

SOURCE VENTILATION

Determine whether the home complies with the local exhaust requirements for kitchens and baths of ASHRAE Standard 62.2-2010, Section 5 and Appendix A, as applicable. Determine whether kitchen and bath exhausts are present and vent to the outdoors.

HEALTHY INDOOR ENVIRONMENTS

n Actions | Expanded Actions

Table 1: Radon Testing Options and Reduction Strategies

Pre-Work Test Result and *Precautionary Measures*	Post-Work Test Result	Minimum Actions	Expanded Actions
<2 pCi/L *Consider precautionary radon reduction actions as part of energy upgrade work, especially covering exposed earth, air sealing open sumps, ensuring floor drains have traps and that traps are not dry.*	<2 pCi/L	No action.	
	>2 and <4 pCi/L	Complete foundation air sealing strategies.	For post-work radon levels between 2 and 4 pCi/L, refer client to EPA's Citizen's Guide to Radon and Consumer's Guide to Radon Reduction and/or mitigate in accordance with ASTM E2121.
	≥4 pCi/L ≥4 pCi/L	Mitigate in accordance with ASTM E2121.	
>2 and <4 pCi/L *Take precautionary radon-reduction actions: complete foundation air sealing strategies as part of energy upgrade work.*	<4 pCi/L and NOT higher than pre-work level.	No further minimum action.	For post-work radon levels between 2 and 4 pCi/L, refer client to EPA's Citizen's Guide to Radon and Consumer's Guide to Radon Reduction and/or mitigate in accordance with ASTM E2121.
	<4 pCi/L AND higher than pre-work level.	Verify that foundation air sealing strategies were completed appropriately and correct deficiencies.	For post-work radon levels between 2 and 4 pCi/L, refer client to EPA's Citizen's Guide to Radon and Consumer's Guide to Radon Reduction and/or mitigate in accordance with ASTM E2121.
	≥4 pCi/L	Mitigate in accordance with ASTM E2121.	
≥4 pCi/L *Complete all foundation air sealing strategies as part of energy upgrade work.*	<4 pCi/L	No further minimum action.	For post-work radon levels between 2 and 4 pCi/L, refer client to EPA's Citizen's Guide to Radon and Consumer's Guide to Radon Reduction and/or mitigate in accordance with ASTM E2121.
	≥4 pCi/L but NOT higher than pre-work level.	Refer client to EPA's Citizen's Guide to Radon and recommend radon mitigation.	Mitigate in accordance with ASTM E2121.

≥4 pCi/L but NOT higher than pre-work level.	Refer client to EPA's Citizen's Guide to Radon and recommend radon mitigation.
≥4 pCi/L AND higher than pre-work level.	Mitigate in accordance with ASTM E2121.

INTERVENTIONS

Keep it:

- 2. Clean
- 3. Pest-Free
- 5. Safe
- 6. Contaminant-Free
- 7. Maintained

Interventions Start with Education

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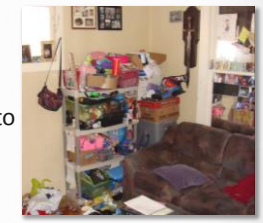
Keep it Clean Interventions

- Surfaces must be not just clean, but clean**able**
- Major benefits:
  - Reduced exposure to various contaminants
  - Reduced harborage for pests



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Keep it Clean Interventions

1. Dust mite control
2. Floor choices and vacuums
3. HVAC systems / duct cleaning
4. Clutter
5. Cleaning agents
6. Portable air cleaners

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Exercise 7: Keep it Clean Interventions

Group 1:

A. Dust mite control
B. HVAC systems/duct cleaning
C. Cleaning agents

Group 2:

A. Floor choices and vacuums
B. Clutter
C. Portable air cleaners

Keep it Safe Interventions

Trips and Falls Interventions

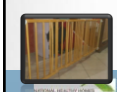
What intervention does the picture show?

Make sure area rugs are secure.

Install railings on stairways.

Install grab bars in bathrooms.

Install window guards on upper level windows.



Use safety gates to prevent children from falling down stairs.

Trips and Falls Interventions

What intervention does the picture show?

Remove trip hazards (e.g. toys and other objects).

Repair broken stairs.

Increase lighting in stairwells, entryways and hallways.

Use nonskid surfaces in bathrooms.

Make sure toilets, showers and bath entries are an appropriate height.

Fire, Heat and Related Interventions

Hint: I'm useful because, where there's ____, there may be fire.

Hint: this helps everybody in the house knows where to go if there is a fire.

Hint: Hot water should only get so hot.

Hint: A shocking problem should be fixed.

Hint: I'll know if you burn blue or yellow.

Hint: Put that fire out!

Hint: Dryers have to breathe too.

Hint: Pew, somebody throw away the rotten eggs.

Child Safety Interventions

What safety interventions would you offer?

Photo courtesy of the Center for Environmental Health, Children's Mercy Hospital, © 2010.

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What do you do if you see these situations?

Photo courtesy of the Center for Environmental Health, Children's Mercy Hospital, © 2010.

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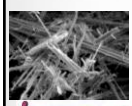
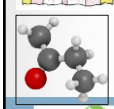
Keep it Contaminant-Free Interventions

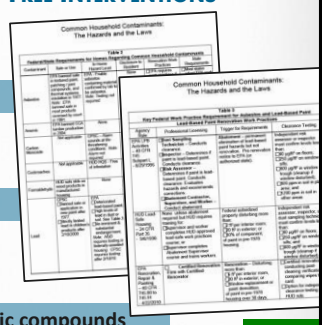


Asbestos

Radon



Volatile organic compounds



Essentials Manual

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Asbestos

Perhaps, the easiest intervention of all to remember . . . . .

**DON'T DISTURB –
CALL IN A PROFESSIONAL
TO TAKE A SAMPLE**

Asbestos

When to call a professional:

- You suspect asbestos, and
- The resident plans to remodel the home, or
- Building material with possible asbestos is damaged

What kind of professional?

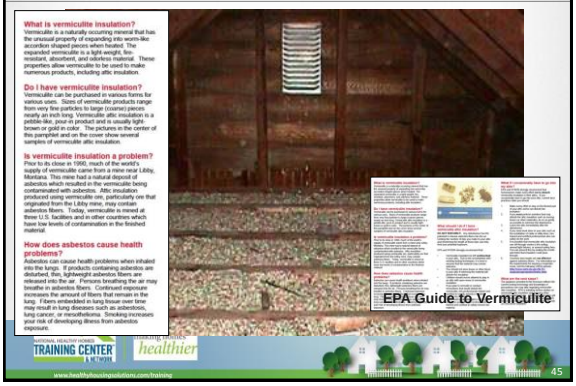
- Asbestos inspectors
- Asbestos contractor
- Check state and local laws for requirements.
- State agencies have lists of accredited professionals.
- https://www.epa.gov/asbestos/state-asbestos-contacts

Friable Asbestos

Friable asbestos-containing material (friable ACM):

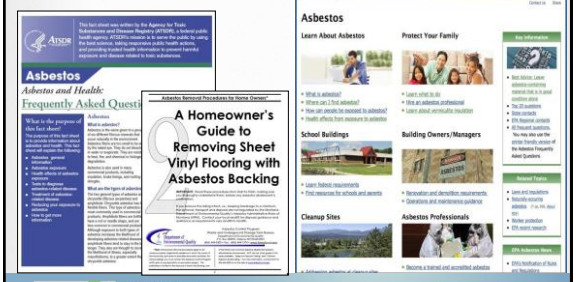
- any material with more than 1% asbestos by weight or area, depending on whether it is a bulk or sheet material and,
- can be crumbled, pulverized, or reduced to powder by the pressure of an ordinary human hand

VERMICULITE



How to "handle" suspected asbestos

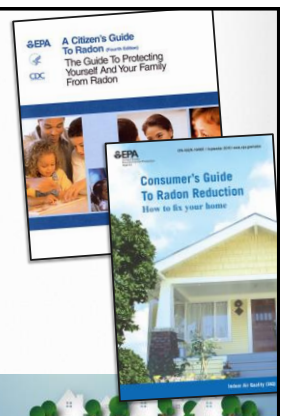
Educate your client



RADON

Fixes for Existing Housing:

- ✓Seal floor and cracks
- ✓Vent from below slab
- ✓Fan sucks air – active system
- ✓Sump suction reduces entry



Finding a Qualified Radon Contractor

- Contact EPA
https://www.epa.gov/radon/find-information-about-local-radon-zones-and-state-contact-information#radonmap
- Contact a private national proficiency programs

http://aarst-nrpp.com/wp/

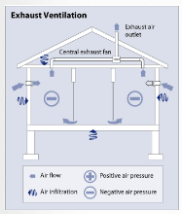
http://www.nrsb.org/

Volatile Organic Compounds

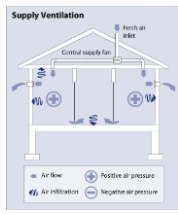
Educate for these simple steps:

1. Don't use it if you don't have to.
2. Substitute a better product.
3. Store materials properly.
4. Ventilate.

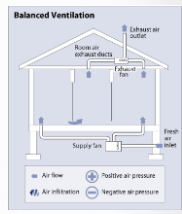
Keep it Ventilation - Strategies



Exhaust Only



Supply Only



Balanced
Exhaust and Supply

Keep it Maintained Interventions

- General maintenance is essential
- Addressing lead-based paint is critical.

EPA Renovation Repair and Painting Rule (RRP)

Firms performing renovation, repair or painting projects that disturb lead-based paint in homes, child care facilities and pre-schools built before 1978 must:

1. Have their firm certified by EPA (or an EPA authorized state),
2. Use certified renovators who are trained by EPA-approved training providers and
3. Follow lead-safe work practices.

Essentials Manual

Firm Certification

Firms that require certification:

- Anyone paid to perform work that disturbs paint in housing and child-occupied facilities built before 1978 must be certified.
- Examples:
  - Residential rental property owners / managers
  - General contractors
  - Special trade contractors

Lead-safe Work Practices

BEFORE renovation, firms must distribute EPA's Renovate Right booklet

DURING renovation
Examples of requirements:

- Work area must be contained to prevent dust and debris from leaving the work area
- There must be a thorough clean up followed by a procedure to verify that the work area is free of lead contamination.

What is your Responsibility as an HHE?

- Know if a house was built before 1978,
- Identify whether the property has deteriorated paint,
- Educate the resident about the RRP requirements

Keep it Pest-free Interventions

Integrated Pest Management (IPM)

- The best approach to managing pests
- HUD, CDC, EPA, the National Pest Management Association all consider it the best practice in managing pests
- Not new, unproven or radical
- HUD has implemented IPM since 1995

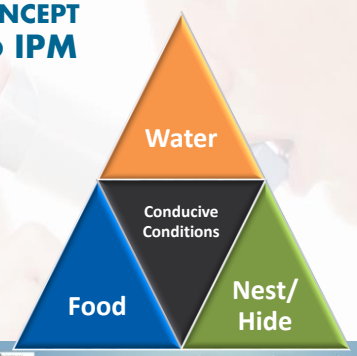
What is IPM?

Integrated – IPM uses multiple methods that work together, and have the least risk to people and the environment.

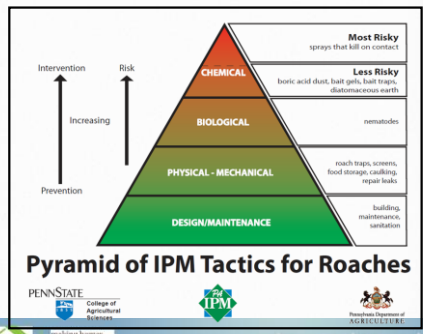
Pest – IPM is used for many pests. We'll cover cockroaches, mice, rats and bedbugs.

Management – you can't get rid of pests forever but you can successfully manage them.

The Concept Behind IPM



Example: Handling Roaches the IPM Way



Pyramid of IPM Tactics for Roaches

What is IPM?

The IPM approach includes multiple, integrated tools:

Educational tools – educating residents to change behaviors so no available food, water or hiding places for pests in their house.

Physical tools – preventing pests from getting into a house (e.g. sealing up cracks in a foundation and / or using snap traps)

Chemical tools – using low-toxicity pesticides with limited exposure to people when using (e.g. cockroach bait stations)

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The Six Steps of IPM

Steps	Description
1. Inspection and Identification	Inspect the property and identify the pests.
2. Exclusion	Keep the pests out of the house.
3. Educate residents	Help residents understand their important role in managing pests.

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The Six Steps of IPM

Steps	Description
4. Sanitation	Make sure food, water and hiding places are not available to pests.
5. Physical and Chemical Control	Use glue traps (cockroaches), snap traps (mice), and rat traps. Use bait stations for cockroaches and insecticide dusts.
6. Monitoring	Use glue traps and snap traps to control pests and monitor property to make sure they haven't returned.

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Primary Benefits of IPM

It's Safer

By their very nature, pesticides are toxic. IPM minimizes the use of pesticides so people, animals and the environment are much less likely to be harmed.

It Works

For insects, conventional pest control primarily utilizes spraying, and sometimes fogging. The problem with these methods is that they only kill the insects they touch. What about those that are hidden?

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1. Inspection & Identification

- Thorough inspection
- Identification of pests found

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Identification Resources

- National Pest Management Association's (NPMA) Field Guide app for identifying pests. Go to Apple Store or Google Play Store to download (costs $4.99).
- For cockroach identification, go to https://ecommons.cornell.edu/handle/1813/43848, click on "found-cockroach-bro-NYSIPM.pdf" under VIEW/OPEN.
- The University of Minnesota Cooperative Extension at: http://www.extension.umn.edu/garden/insects/find/insects-by-category/#household.
- The University of Kansas at: http://entomology.k-state.edu/extension/insect-information/household-pests.html

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What to Look for and Where to Look

What to look for:

- The pest *(dead or alive)*
- Pest body parts *(yes, eww)*
- Droppings *(also eww)*
- Nests and burrows

Where to look:

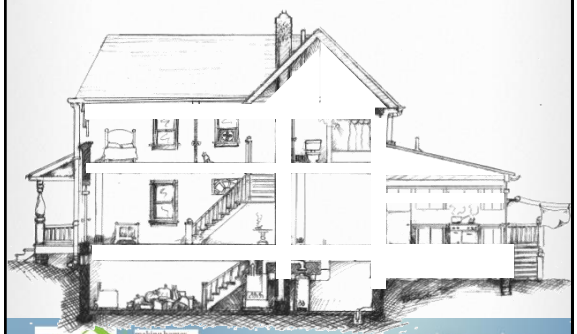
- Near food and water sources
- Hidden places (e.g. behind an appliance)
- Near entry holes

Rat burrow entrance

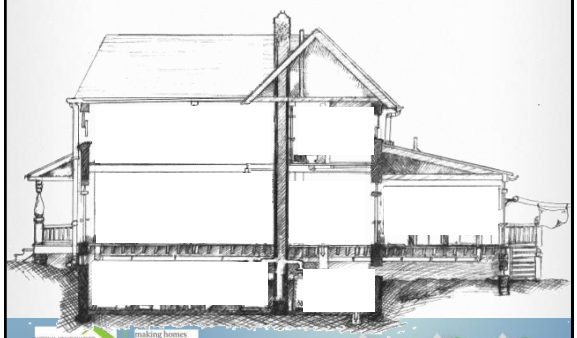
Rat proofing did not work here…

Get down on the ground and look under the pipe…

A Person's View



A Cockroach's View



2. Exclusion

Examples:

- Install door sweeps.
- Seal cracks and crevices with silicone caulk.
- Pack larger crevices with copper or stainless steel mesh.

3. Educate Residents

- Residents can make or break an IPM effort
- Facilities staff and pest management professionals are important for multifamily buildings

4. Sanitation

Photo: City of Houston Bureau of Children's and Environmental Health

- Food
- Water
- Harborage

A Note on Water

- Essential for insects & rats, but not for mice or bedbugs
- Mosquitoes
- Structural damage

Photo: City of Houston Bureau of Children's and Environmental Health

5. Physical Control

- Traps
- Baits and gels
- Inert dusts
- Insect growth regulators

Be Aware of Illegal and Risky Pesticides

- Pesticides that look like candy - mothballs
- "Miraculous" Chinese Insecticide chalk
- "Tres Pasitos"
- Many pesticide have been withdrawn

candy!

EPA Signal Words for Poisons

CAUTION means the pesticide product is slightly toxic if eaten, absorbed through the skin, inhaled, or it causes slight eye or skin irritation.

WARNING indicates the pesticide product is moderately toxic if eaten, absorbed through the skin, inhaled, or it causes moderate eye or skin irritation.

DANGER means that the pesticide product is highly toxic by at least one route of exposure. It may be corrosive, causing irreversible damage to the skin or eyes. Alternatively, it may be highly toxic if eaten, absorbed through the skin, or inhaled.

POISION — If this is the case, then the word "POISON" must also be included in red letters on the front panel of the product label.

6. Monitoring for Cockroaches

- Keep looking to spot reinfestations
- Place glue traps in corners
  - Behind appliances
  - Under sink
  - Under cover!
- Date and mark
- Don't disturb

6. Monitoring for Rodents

- Use snap traps
- Place in corners, along runways and in tight dark spaces
- Check daily
- Increase trapping if monitors indicate activity
- Always have monitors for insects and rodents in place

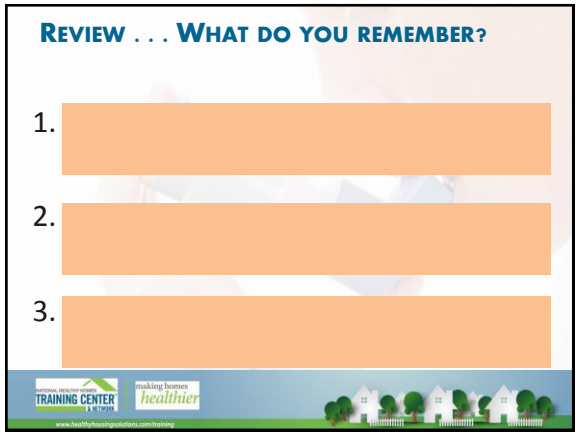


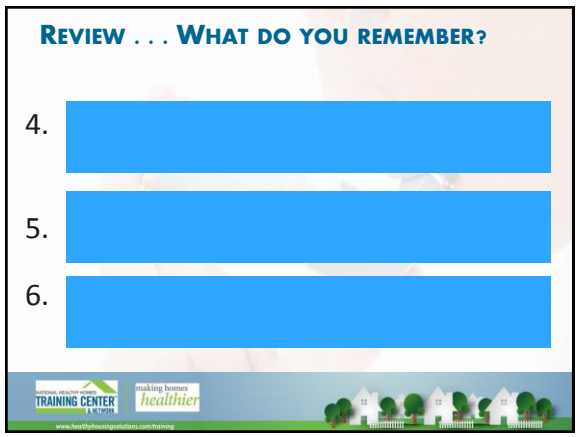
The Panic of Bed bugs

- Can be avoided and eliminated
- Every skin irritation or bite is not bed bugs
- You can see them.
- Do not cause or spread diseases.

Bed bug - Treatment

- Inspection
- Vacuum
- Heat or cold
- Pesticides by PCO only
- Re-inspection and retreatment
- Encasements and interceptors


REVIEW . . . WHAT DO YOU REMEMBER?
1.
2.
3.
TRAINING CENTER
making homes healthier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4.
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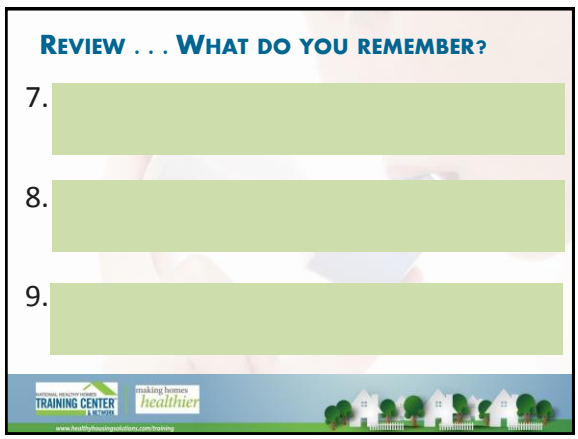
TRAINING CENTER
making homes healthier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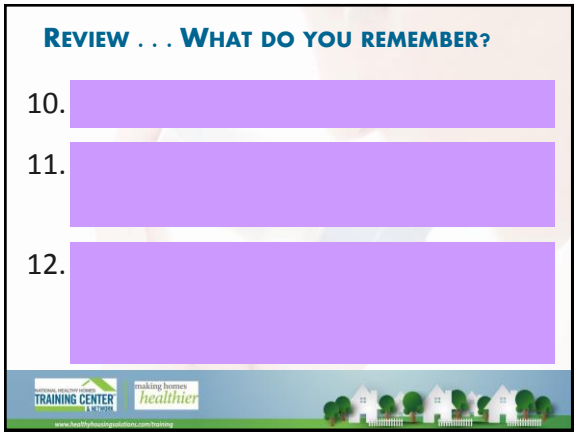
making homes healthier


REVIEW . . . WHAT DO YOU REMEMBER?
10.
11.
12.
TRAINING CENTER
making homes healthier


REVIEW . . . WHAT DO YOU REMEMBER?
10.
11.
12.
TRAINING CENTER
making homes healthier

Table 3. Overview of Assessment Strategies for Selected Residential Hazards

Residential Hazard	Assessment Strategy				
			Environmental Sampling		
	Visual Assessment	Occupant Survey	Dust	Air	Building Performance Testing
Biological Hazards					
Dust mite allergens	X[6]		X[1]	X	
Cockroach allergens	X[6]	X	X[1]	X	
Rodent allergens	X[6]		X[2]	X[2]	
Pet allergens	X[6]	X	X[2]	X[2]	
Mold	X[6]	X[3]	X[2]	X[2]	
Bacterial endotoxins	X[6]		X	X	
Chemical Hazards					
Pesticides	X	X[4]	X[2]	X[2]	
Carbon monoxide	X	X[5]		X	X
VOCs, including formaldehyde	X[8]	X[4]		X	X
Lead			X		
Radon				X	
Particulate Matter (e.g., $PM_{2.5}$)				X	
NO_2				X	
Structural Hazards					
Structural defects	X	X[3]			
Excess moisture	X	X[3]			X[7]
Poor ventilation	X			X	X
Unhygienic conditions	X	X			
Carbon dioxide (CO_2, fresh air indicator)				X	X
Slip, trip, fall hazards	X				
Un-cleanable surfaces	X				
Missing/malfunctioning safety devices (e.g., smoke and CO alarms)	X	X			
Behavioral Hazards					
Cigarette smoking/2nd- & 3rd-hand smoke	X	X		X	
Poor safety practices (e.g., no childproofing)	X	X			
Lack of supervision of children		X			
Unsafe use of products and appliances	X	X[4]			

Residential Hazard	Assessment Strategy				
	Visual Assessment	Occupant Survey	Environmental Sampling		Building Performance Testing
			Dust	Air	
Poor cleaning practices	X	X	X		
Toxic personal/consumer product choices		X[4]			
Poor ventilation practice (e.g., choose not to use kitchen or bathroom exhaust fans)		X			
Other					
Lack of professional inspection (e.g., of gas appliances)		X			
Lack of safety education		X			

[1] Substance primarily found in settled dust; airborne with dust disturbance.

[2] Substance may be found in both settled dust and air.

[3] Occupant survey can provide information on historical events, e.g., past sewer backups, plumbing leaks, water intrusion and surface mold no longer apparent in a visual assessment.

[4] Survey regarding consumer product choices.

[5] Occupant survey can provide information on behavior that may influence CO levels, e.g., using a gas oven for heating or running a car in an attached garage.

[6] Although not visible to the naked eye, the presence of various allergens may be indicated through the visual assessment of living sources of the allergens (e.g., pets, rodents) or their detritus; or through observation of structural hazards that look for excess moisture (which invites dust mites, cockroaches, molds, and bacterial toxins), unhygienic conditions (in which cockroaches and rodents flourish), and structural defects (allowing entrance of cockroaches and pests), .

[7] Moisture meters can be used to detect the amount of moisture in walls and other solid surfaces.

[8] Although not visible to the naked eye, potential VOC hazards can be assessed during construction and renovation through observation of materials (e.g., low-VOC paints, adhesives, building materials, carpet, etc.).

Similarly, Public Health Seattle-King County (PHSKC) developed a "Home Environment Checklist" (HEC) that community health workers use to assess homes of asthmatic children (PHSKC 2009). They look for visual indications of asthma triggers and other hazards and use the information gleaned from the HEC, together with a caregiver health survey interview, to prepare a home-specific and child-specific asthma action plan.

Visual measures such as dampness, visible mold growth, signs of cockroach or rodent activity, the presence of pets, the presence and condition of upholstery and carpets, the presence of sources of CO or volatile organic chemicals (VOCs), and general cleanliness, can all be used to identify particularly obvious sources of potential asthma exacerbation. Chew et al. (1998) evaluated the usefulness of a home characteristics questionnaire in predicting indoor allergen levels and found that although certain home characteristics (such as smooth versus carpeted floors) were significant predictors of increased allergen levels, home characteristics reporting was a relatively weak predictor of the absence of allergen. For example, in comparison to dust from smooth

Principle #1: Keep It Dry

Review of the Evidence

Ventilation and moisture control are typically related. Both ventilation and dehumidification help to reduce humidity levels and exposure to dust mites. A national survey found the use of a dehumidifier predicted lower levels of some asthma triggers and mold.[7] Additionally, installation of a whole-house mechanical ventilation system can reduce humidity, thus decreasing dust mites and improving clinical outcomes.[8, 9] Effective dehumidification in temperate climates can be achieved with air conditioners and/or dehumidifiers.[10] In climates with high humidity, whole-house ventilation has been less effective.[11, 12, 13] Climate zone must therefore be considered when making decisions about dehumidification.

Ventilation can improve indoor air quality when the outdoor air has lower levels of humidity and contaminants than the indoor air. Conversely, families in housing near pollution point sources such as industrial sites, high-pollen forested sites, and high-traffic roadways may need to filter or otherwise clean the outdoor air that enters the home environment.

Structural Interventions

Structural deficiencies related to moisture include water intrusion through the building envelope, plumbing leaks, drainage problems, and condensation. Key structural control methods are shown in Figure 5.2. Chapter 4 identifies a number of structural factors central to moisture control and how to assess when these controls have failed. The HUD/CDC *Healthy Housing Reference Manual* describes maintenance practices, proper insulation, and how to prevent moisture intrusion from a home's foundation, walls, and roof. The Reference Manual also provides information on the operations and maintenance of plumbing systems, venting requirements for plumbing systems, and methods to conserve water.

Figure 5.2 Key Structural Controls for Moisture

1. Limit water entry (e.g., maintain gutter systems).
2. Dehumidify damp spaces such as basements.
3. Repair leaks and assure that drains work properly.
4. Clean or properly remove wet or moldy building components.
5. Manage ventilation systems so that moisture is removed at the source.

Finished basements require special consideration regarding moisture control. In general, such spaces should not use sheetrock or paneling to cover exterior walls or wall-to-wall carpeting, both of which can lead to moisture and mold problems. Capillary breaks are discussed below as one way of controlling moisture in basements.

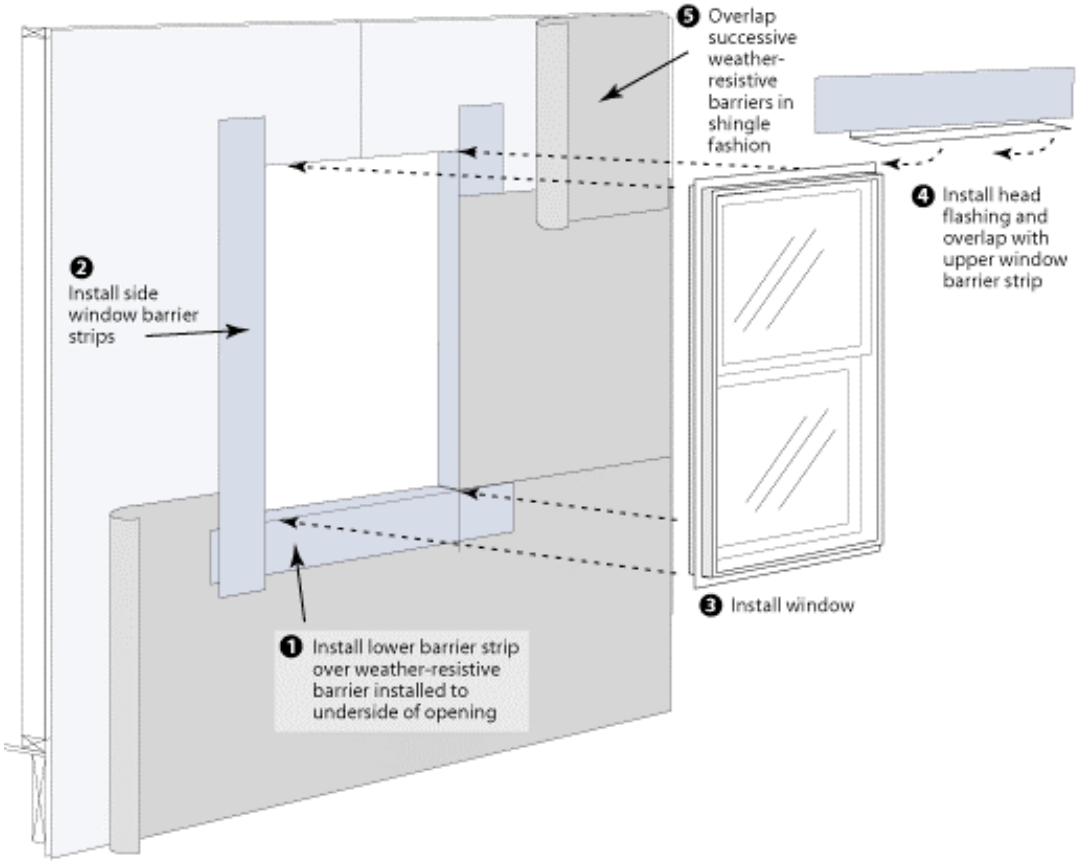
Controlling Building Envelope Leaks

Ensuring that roofs, walls, and foundations shed water effectively helps to control leaks. Absence or deterioration of flashing is a common building deficiency associated with water leakage through the building envelope. Flashing refers to thin continuous pieces of sheet metal or other impervious material installed to prevent water from passing into a structure through an angle or joint (Figure 5.3).

When new building components such as windows are installed, they should be accompanied by pan flashing to shed water away from the wall penetrations and prevent water from entering the structure. Flashing at the base of structures should allow water that has been repelled by the flashing to escape the plane of the building surface. The principle of flashing should be extended to all penetrations in structures. In other words, all of them should be sealed to prevent moisture as well as pest incursion into the living space.

Maintaining proper grading around a foundation and preventing erosion that can lead to pooling of water helps prevent moisture intrusion into

Figure 5.3 Window Flashing



Source: http://www.energysavers.gov/your_home/windows_doors_skylights/index.cfm/mytopic=13470

basements and reduces the need for expensive foundation waterproofing and excavation. This practice also promotes the durability of the structure by reducing the prospect of settling, which can sometimes lead to cracks. Specific interventions are discussed below.

- In new construction, install capillary breaks around interior foundation walls to prevent water from "wicking" up from the ground and into the building through capillary action. Capillary breaks can also be installed in existing construction. Capillary breaks are needed to prevent vertical moisture movement, such as from the foundation wall up into the wall or floor framing (only practical in new construction) and horizontal moisture movement, such as soil moisture moving through the foundation wall into the basement or crawl space. This is accomplished by water-proofing or damp-proofing the exterior side of the foundation wall during construction. While usually very expensive to carry out as a retrofit, it is sometimes the most cost-effective way to control moisture in existing homes when combined with perimeter drainage and proper grading away from the structure. Construction information on capillary breaks is available in EPA's Indoor airPLUS construction specifications (epa.gov/indoorairplus/construction_specifications.html).
- In existing structures, a retrofit with French drains or other means of diverting water away from foundations may be needed.
- Gutters and downspouts should drain water from the roof to the ground with no breaks in the system. Drainpipes or splash blocks should redirect water from the downspouts away from the foundation, but care should be taken not to direct the water near the foundation of the neighboring building.
- Planter boxes, decks, or other outdoor structures should be placed so that they do not obstruct rainwater flow or snowmelt from the foundation (Appendix 5.1).

Condensation can occur when warm, moist air comes in contact with a cold surface. This can lead to mold and other problems, creating health hazards and building decay. Sometimes condensation occurs within walls, ceilings and floors that separate the outside unconditioned air from the conditioned air inside the structure as warm moist air travels through the cavity. Crawl spaces, attics, and exterior walls can be affected. In some cases a vapor retarder (often called a vapor barrier) is recommended to inhibit condensation from the movement of moisture-laden air into walls, ceilings, and floors. Placing a heavy plastic sheet on the bare ground in a crawl space, carefully sealing any seams, and sealing the plastic to the foundation can minimize moisture movement from the crawl space into the structure.

Note that vapor retarders require careful thought. If an insulated wall has materials on both the interior and exterior surfaces that retard vapor movement, moisture can become trapped within the wall cavity and cause a serious problem. Walls should be designed so they dry in at least one direction.

Similarly, cold water pipes located in areas where the air is warm should be insulated to prevent condensation. One way of detecting this problem is to look for areas of discoloration where condensation from pipes has dripped onto a lower surface. The same principle applies to ductwork that carries warm or cold air through air zones with a high temperature gradient. Ductwork should be sealed and well insulated in unconditioned spaces to prevent condensation. Insulation should be applied to the exterior of the ductwork, not the interior. While insulation of ductwork is a simpler matter in new construction, poor insulation of ductwork in existing housing can result in condensation inside ductwork and become a significant breeding ground for mold and other biological agents.

Ensure that windows are adequately installed, caulked, and insulated to prevent condensation—a cause of both mold and lead-based paint failure. Replacing old single-pane windows with modern double- and triple-pane windows can effectively eliminate window condensation problems. This intervention may be cost-prohibitive for healthy homes programs unless funds can be leveraged through partnerships, from lead hazard control and/or weatherization programs, or the private sector.

Reduce moisture sources with high quality exhaust fans in bathrooms and kitchen, and proper venting of dryers, to substantially reduce the likelihood of condensation on windows or walls. Finally, eliminate insulation voids in walls and ceilings since cold interior wall surfaces in the winter can lead to condensation and mold.

Prompt Repair of Plumbing Leaks

How water and moisture leave a home are as important as how they enter. Plumbing is often overlooked as a significant source of moisture because leaks can be slow or undetected. Drain traps can degrade or dry over time if the drain trap is not kept full of water. Basement floor drain traps should be kept full by adding water periodically to prevent harmful soil and/or sewer gases from being emitted.

Safe Cleaning or Removal of Wet or Moldy Items

Failure to correct the source of moisture that produced mold contamination guarantees the eventual failure of mold remediation efforts. There are established procedures for safely removing wet and moldy building materials and furnishings, typically involving minimizing the disturbance of such materials to prevent mold spores from becoming airborne.[14, 15, 16] Projects requiring large areas of mold decontamination (e.g., more than ten square feet) may warrant the use of a mold mitigation professional. Improper

solutions, such as blowing air over mold contaminated items, can increase exposures and may do more harm than good. Individuals attempting to mitigate mold problems should be trained to prevent exposure to mold during the elimination process through the use of respiratory, eye and skin protection equipment.

Appropriate Design, Installation, and Management of Heating, Ventilation, and Air Conditioning (HVAC) Systems

Many kitchen fans in older homes simply recycle air coming from stoves and ranges rather than vent it to the exterior of the building. Some current building codes for new construction require that kitchen range hoods be exhausted to the outside. Check by looking above the fan or range hood to see whether there is ductwork and examining the exterior wall for a flap that would exhaust the air. Installers often forget to remove the manufacturer's tape on the flap, so it is important to ensure that the flap is not only present but functioning properly. Bathroom exhaust fans and clothes dryers must be vented to the outside.

In general, a home's relative humidity should be kept in the 30–50 percent range. Filters in clothes dryers, kitchen ranges, furnaces and bath exhausts should be cleaned and/or replaced to ensure air flow is adequate and moisture does not accumulate on the dust in the filters. Instructions on when and how to clean and replace filters properly should be part of a program's education intervention strategy.

Air conditioning or dehumidifying systems need to be checked regularly and cleaned to ensure that condensate drains do not become blocked. Blockage results in leaks from the drainage pans onto surfaces that may not be visible. Condensate pans should be properly sloped so that water runs to the drain and does not pool in other areas. Cooling coils need to be kept clear and clean to prevent blockage as well as prevent high fuel consumption due to lower heat transfer. Homeowners/residents or maintenance personnel can take care of this for window air conditioners, but for central air conditioning systems, a licensed contractor is generally needed.

Some heating, ventilation, and air conditioning systems (HVAC) are equipped with humidifiers, especially in northern climates where indoor winter air becomes dry. In other cases, individual rooms may be equipped with portable humidifiers. In both cases, the water supply, water tank, and water wheels or other distribution systems should be kept clean. If the systems are not used for some time, they can become breeding grounds for biological agents, including mold, bacteria, and viruses. Very dry conditions in the house may be due to dry cold air entering the home during the winter. Proper air sealing may remove the need for a humidifier.

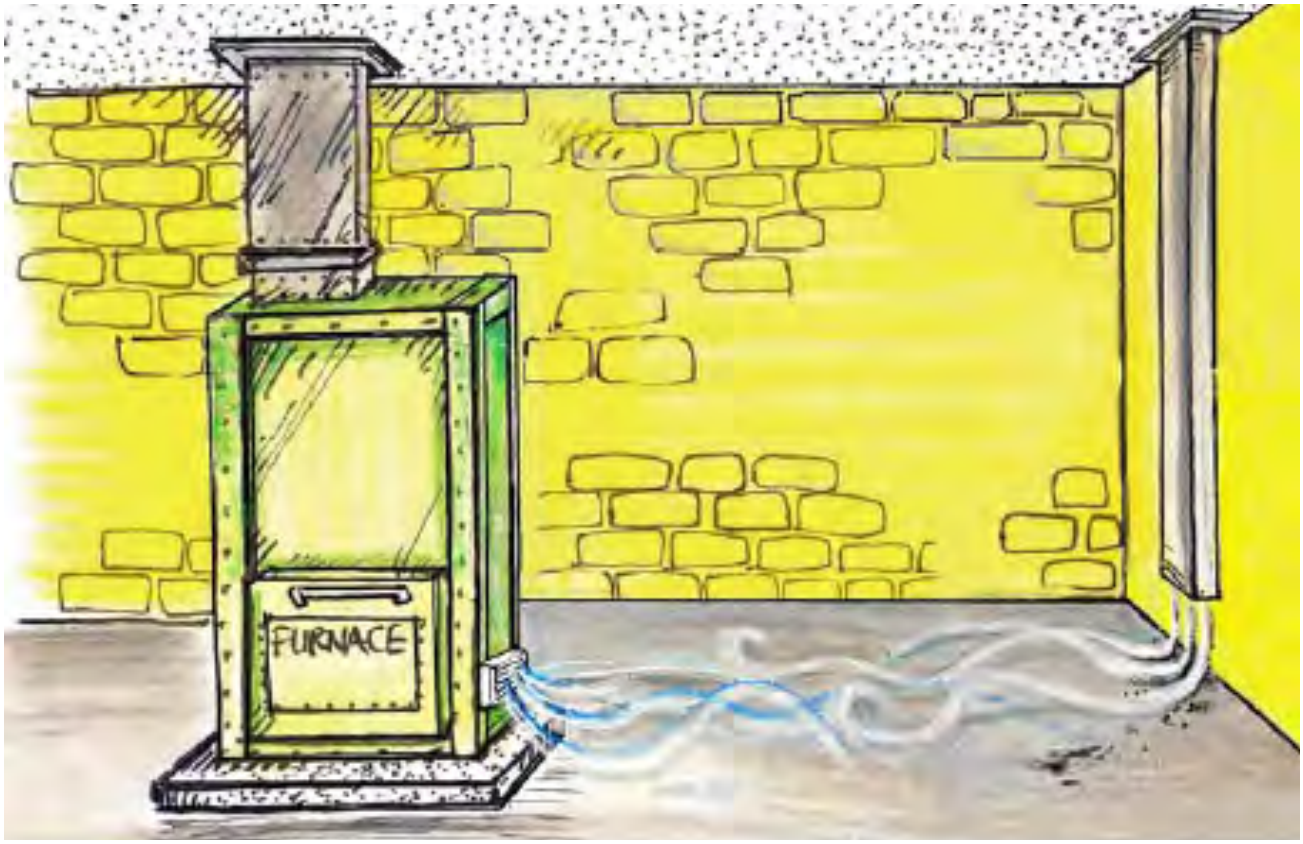
If an area has become wet, drying is typically the first step in remediation after eliminating the moisture source (Figure 5.4). However, some forms of drying can exacerbate the problem. Blowing high-velocity air streams over surfaces contaminated with extensive mold can cause mold spores and fragments to become airborne, where they can be inhaled readily or contaminate other surfaces. Use of dehumidifiers, personal protection and other measures can help to avoid these problems. In some cases, it may be necessary to discard contaminated items that cannot be properly cleaned. If the extent of damage is extensive, trained professionals should address the problem. It is equally as important to identify the moisture source and to make needed repairs to prevent reoccurrence. During catastrophic water events (e.g., pipe breaks, water heater failure, flooding), time is of the essence. Typically, water needs to be removed within 24–48 hours, after which mold begins to develop. Many restoration companies are now available to extract water following a flood using dehumidifiers, fans, and other tools.

Figure 5.4 Remediation Guidance

Mold and moisture remediation guidelines are available from the following organizations:

- EPA: http://www.epa.gov/mold/moldcleanup.html.
- New York City Health Department: http://www.nyc.gov/html/doh/html/epi/moldrpt1.shtml.
- AIHA: http://www.conferencemedia.net/store/stores/aihce/american-industrial-hygiene-conference-and-expo-2009/perspectives-on-the-aiha-green-book.html.

Figure 5.5 Unhealthy Heating System Using Basement Air



The illustration shows returning air entering the basement air, then supplying the furnace with air distributed throughout the house. Figure 5.6 shows a simple fix that avoids contamination of supply air.

For some moisture problems, changes to the HVAC system may be needed. For example, a ventilation system that draws air from a moist basement instead of a living area may result in dispersing moisture and mold throughout the house (Figures 5.5 and 5.6). This type of system is sometimes called "the Cleveland Drop" because it was first identified in a number of Cleveland-area houses that were investigated for mold and moisture problems. A solution is to ensure that the air supplying the furnace is supplied from the exterior or from a living area, rather than the basement. Leaky ductwork can also lead to problems because it may draw in air from unconditioned spaces. Ductwork should be sealed to prevent such leaks. For new construction, information is available in EPA's Indoor airPLUS construction specifications: www.epa.gov/indoorairplus/construction_specifications.html.

Reporting Moisture and Leak Problems

Owner occupants and renters should be encouraged to conduct regular visual assessments to identify leaks and condensation. Tenants need to have confidence that requests for minor repairs and reporting maintenance needs are taken seriously or they will fail to report problems when they are relatively easy to correct. Tenant failure to promptly report problems and property owner failure to respond represent major problems in economically distressed rental housing. Clarifying roles and expectations and providing incentives for responsible behavior are important tools for healthy homes programs.

2.0202.1 Unvented Space Heaters: Propane, Natural Gas, and Kerosene Heaters

Favorite

Topic: Combustion Safety
Subtopic: Unvented Space Heaters
Desired Outcome: Elimination of combustion byproducts

For supporting material, see Referenced Standards and Calculation of the Infiltration Credit.

Single-Family Homes | Manufactured Housing

Select All | Print | Copy to Excel | Email

	TITLE	SPECIFICATION(S)	OBJECTIVE(S)
☐	2.0202.1a Removal	With the occupant's permission, unvented heaters will be removed except when used as a secondary heat source and when it can be confirmed that the unit is listed to *ANSI* Z21.11.2 Units that are not being operated in compliance with *ANSI* Z21.11.2 should be removed before the retrofit but may remain until a replacement heating system is in place Failure to remove unvented space heaters serving as primary heat sources has the potential to create hazardous conditions and thus any further weatherization services will be re-evaluated in the context of potential indoor air quality risks	Eliminate sources of combustion byproduct within a living space
☐	2.0202.1b Occupant education	Occupant will be educated on potential hazards of unvented combustion appliances (primary or secondary) within a living space	Inform occupant about possible hazards associated with combustion byproducts and moisture

Exercise #7 on Keep It Clean Interventions

Group 1:

A. Dust mite control
B. HVAC systems / duct cleaning
C. Cleaning agents

Group 2:

A. Floor choices and vacuums
B. Clutter
C. Portable air cleaners

Create flip chart sheets covering each intervention with the following key points:

1. What is the intervention?
   - Use a verb! (e.g. install, avoid, clean, use, etc.)
   - Provide relevant details for implementing the intervention
2. What hazard(s) are addressed?
3. What are the potential health impacts of the hazards?
4. Key details and points of contention (if any)

Draft this information for your flip chart sheets in a way that a resident can understand.

1. Use language that is plain and free of technical jargon.
2. Don't overwhelm with too many details. Focus on what is necessary information.

REFERENCES:

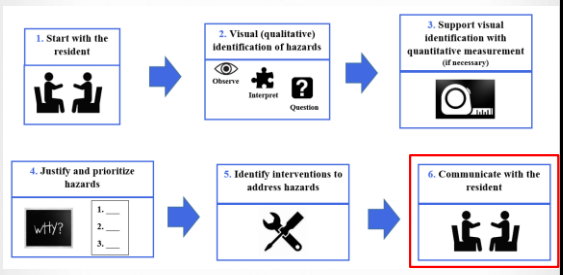
Topic	Title of reference	Within reference	Where to find
Dust mite control	Essentials for Healthy Homes Practitioners – Student Manual	Keep it Clean, page 5.2	Provided with Healthy Home Evaluator materials.
HVAC systems / duct cleaning	Healthy Homes Program Guidance Manual, July 2012	Page 121 - 122	In your binder, or at http://portal.hud.gov/hudportal/HUD?src=/program_offices/healthy_homes/HHPGM
Cleaning agents	Healthy Homes Program Guidance Manual, July 2012	Page 122	In your binder, or at http://portal.hud.gov/hudportal/HUD?src=/program_offices/healthy_homes/HHPGM
Floor choices and vacuums	Healthy Homes Program Guidance Manual, July 2012	Page 121	In your binder, or at http://portal.hud.gov/hudportal/HUD?src=/program_offi

Topic	Title of reference	Within reference	Where to find
			ces/healthy_homes/HHPGM
Floor choices and vacuums	Carpets and Healthy Homes	All	http://www.nchh.org/Portals/0/Contents/CarpetsHealthyHomes.pdf
Clutter	Essentials for Healthy Homes Practitioners – Student Manual	Keep it Clean, page 5.6 – 5.7	Provided with Healthy Home Evaluator materials.
Portable air cleaners	EPA Guide to Air Cleaners in the Home	All	https://www.epa.gov/indoor-air-quality-iaq/guide-air-cleaners-home

Module 8
Step 6: Communicate With the Resident

Healthy Housing Solutions Inc.

Key Steps

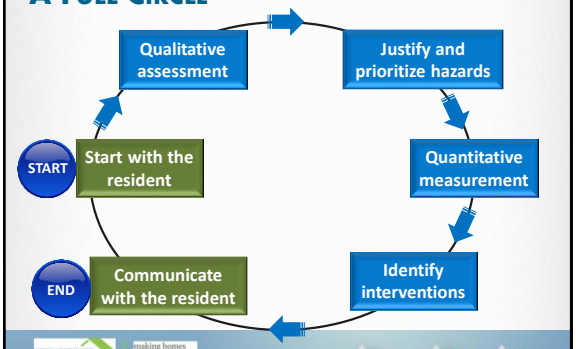


Key Steps

6. Communicate with the resident

- Components of the written report provided to the resident
- Effective verbal communication with the resident
- Creating a scope of work
- Educating the resident
- Referring the resident to other services
- Practicing resident communication

A Full Circle



Communicate with the Resident

1. Results	Provide information on the results of your qualitative and quantitative evaluation.	Included in written report.
2. Quantitative Measurement	Pay special attention to any quantitative measurement results.	
3. Action Steps	Recommend action steps.	
4. Scope of Work	Provide draft scope of work (if necessary).	
5. Referrals	Provide referrals.	
6. Education	Educate the resident about hazards and interventions	

Key Home Assessment Report Components

PART 1: Background information
- Client Contact Information
- Assessment Site Location
- Assessor's Contact Information

PART 2: Introduction
- Reason for assessment
- Assessment scope of services

PART 3: Assessment Results and Recommendations

PART 4: Limitations

PART 5: References

Key Home Assessment Report Components

PART 1: Background information
- Client Contact Information
- Assessment Site Location
- Assessor's Contact Information

PART 2: Introduction
- Reason for assessment
- Assessment scope of services

PART 2: Introduction

- Scope of services
- Reason for assessment

See page 25 of the sample in your binder: Scope of Work and Hypothesis ***(Appendix A - Environmental Health Assessment Report)***


Level 1 Environmental Health Assessment

APP ID #: _____

Contact: _____

Site Address: _____

Contact Phone: _____

Date of Site Visit: _____

_____ _____

Environmental Hygienist Date

_____ _____

Environmental Health Coordinator Date

Key Home Assessment Report Components

PART 3: Assessment Results and Recommendations

PART 4: Limitations

PART 5: References

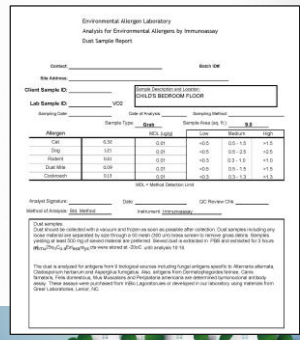
PART 3: Assessment Results and Recommendations

See pages 3 - 16 of the sample in your binder:

1.0 – Environmental Health Issues and Action Summary

PART 3: Assessment Results and Recommendations – Quantitative Results

See examples in your binder from the Quantitative Measurements module.



PART 4: Limitations

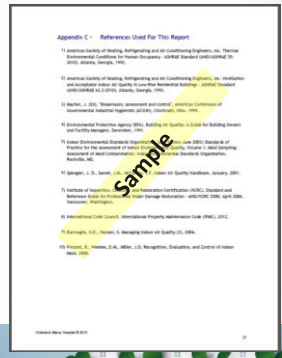
The most important disclaimer is what you could not see or access.

See sample in your binder (page 25)

Report Disclaimer and Conditions

PART 4: REFERENCES

References Used for This Report (page 27)



GENERAL GOALS FOR A HOME ASSESSMENT REPORT

- Avoid information overload.
- Communicate in a way that makes sense to the resident.
- Communicate the bad AND the good.
- Use photos from the home to reinforce issues.
- Address the resident's concerns.
- Provide specific actions the resident can take.
- Connect the assessment with interventions.

Creating a Scope of Work

What is going to be done?

1. Repair the . . .
2. Install a . . .
3. Remove . . .

How will it be done?

1. . . . labeled in accordance with . . .
2. Installed in accordance with . . .
3. . . rating of no more than . . .

Creating a Scope of Work

What is going to be done?

Issues and Owner/Landlord Recommended Actions to take

Issue: Exhaust fan/light fixture was loose and missing a cover in the bathroom located on the first floor.

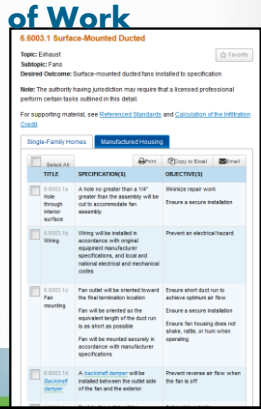
Action(s): 1) Re-attach and install a cover on the exhaust fan in the bathroom

2) Operate fan during, and for 15 - 20 minutes after taking shower/bath to help decrease the humidity level during and to prevent mold and bacteria growth.

Creating a Scope of Work

How will it be done?

Example from the NREL Standard Work Specifications


6.6003.1 Surface-Mounted Ducted

Topic: Exhaust
Subtopic: Fans
Desired Outcome: Surface-mounted ducted fans installed to specification

Note: The authority having jurisdiction may require that a licensed professional perform certain tasks outlined in this detail.

For supporting material, see Referenced Standards and Calculation of the Infiltration Credit

Single-Family Homes | Manufactured Housing

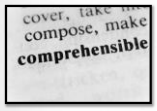
TITLE	SPECIFICATION(S)	OBJECTIVE(S)
6.6003.1a Hole through interior surface	A hole no greater than a 1/4" greater than the assembly will be cut to accommodate fan assembly	Minimize repair work Ensure a secure installation
6.6003.1b Wiring	Wiring will be installed in accordance with original equipment manufacturer specifications, and local and national electrical and mechanical codes	Prevent an electrical hazard
6.6003.1c Fan mounting	Fan outlet will be oriented toward the final termination location Fan will be oriented so the equivalent length of the duct run is as short as possible Fan will be mounted securely in accordance with manufacturer specifications	Ensure short duct run to achieve optimum air flow Ensure a secure installation Ensure fan housing does not shake, rattle, or hum when operating
6.6003.1d Backdraft damper	A backdraft damper will be installed between the outlet side of the fan and the exterior	Prevent reverse air flow when the fan is off

Stay Calm and Educate

OR

In-Home Education

Grab the Moment
A teachable moment might be part of a sit-down conversation, or NOT. It might be as you're doing the visual assessment.



You're Not Making Sense
We get it. You like being an expert. Everyone does. But rein that in and focus on keeping information relevant and understandable.

It's Always About Health
With healthy homes, the absolute bottom line is health. Always connect back to that.

Referrals

Lead risk assessment

Asbestos assessment

Community services

?

Other?

Mold

Radon

Resources to Help Clients Improve Their Home

Look for programs in your community-

- Community Development Organizations
- Neighborhood Improvement Organizations
- Home Weatherization Programs
- Utility sponsored energy efficiency grants
- HUD Healthy Homes Grant Programs

Other Local Resources

- Minor Home Repair Programs
- Asthma Coalitions
- Chronic Disease Coalitions
- School Nurse and Social Worker
- Faith-Based Organizations

Environmental Intervention- Leveraging Resources

Donated Healthy Homes Supplies	Discounted Healthy Homes Supplies
• Smoke Detectors- Red Cross, Fire Dept. • CO Detectors- Some Fire Depts • Radon Test Kits - State Radon Offices • Child Safety Kits - Child Advocacy Organizations	• Home supply manufacturers (filters, paint, caulk, etc) • Hardware stores- local or national • Home Improvement - some more receptive than others • National retailers - have local donation committees • Buy local so families can find replacement supplies and buy local too.

What would you do?

1. Get together with your partner.
2. Your trainer will give you one card for each of two scenarios. For one scenario, you'll get a resident card and for the other, you'll get the HHE card. Don't share your cards with your partner.
3. Spend 10 minutes reading the scenarios and preparing what you would do as the HHE.
4. Practice role playing your approach to working with a resident in the scenario in which you are an HHE. Your partner will play the resident.

Level I Environmental Health Assessment

AFP ID #: _____

Contact: _____

Site Address: _____

Contact Phone _____

Date of Site Visit: _____

_____ _____

Environmental Hygienist Date

_____ _____

Environmental Health Coordinator Date

Understanding Your Safe & Healthy Home Report

This report represents the results of a safe and healthy home assessment recently performed at your home. The report includes a general evaluation of the building and the mechanical components in the building along with an assessment of the appliances in your home. Another section of the assessment provides a room by room evaluation of common healthy home issues that can affect the indoor air and environment quality of a home. This assessment shows what issues, if any, were observed and what you should consider changing about your home to improve indoor environmental quality and make your home the healthiest it can be.

Your assessment professional can help you identify the issues identified in your home during the home assessment and what specific actions can be taken to resolve the issue identified. In order to make your home the healthiest it can be, we recommend you take these actions quickly to reduce or eliminate the issues identified.

It is possible that many issues were identified during your home assessment. The Asthma-Friendly Home Partnership Program will try to help you address many of the issues identified and can provide you with the names of community organizations that may have funding that you can apply for to help cover the cost of repairing some of the healthy home issues identified in this report. If you have any questions regarding this home assessment report, or about the Asthma-Friendly Home Program, or want help working with community organizations to get help with healthy home issues, please contact us at anytime at 816-960-8925.

How to Read the Home Assessment Scores in this Report

For the building, mechanical and appliance pages, each component is assessed separately with a series of statements about the condition of that component. For the room assessments, each room is evaluated using 5 healthy home categories. Each item that is part of a component or room category is rated and scored by the assessment professional. If an item looks "OK-Good" or normal, it receives a score of 100 points, if an item is a "Concern", it receives a score of 50 points, if an item is rated as "Take Action", it received 0 points. The assessment score for each component or room category is then an average score of these different items assessed. For example, the air flow and circulation score for the living room is an average score based on 5 different assessment parts.

The assessment score for each component or room category is then given its safe and healthy home assessment rating based on the following guidelines:

85 - 100 points -OK- Good

If an item looks "OK-Good" or normal, it received an average score for all the items assessed of 85 points or higher.

70 - 85 points -Concern

If an item is a "Concern", it received an average score between 70 to 85 points and means there were enough concerns about a particular home component or room, that it should be changed to help improve the indoor environment of the home.

< 70 points -Take Action

If an item is rated as "Take Action", it received an average score of 70 points or lower. These components or rooms had enough problems with them that we believe they need to be changed as soon as possible to improve your home's indoor environmental health.

Finally, at the bottom of each room page is the Home Assessment Room Score which is the average score for all 5 of the healthy home categories used to assess a specific room. The higher your room assessment score is the "healthier the room is. The goal of this assessment is to help you make these scores as high as possible.

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EHA ID #: _____ Date of Site Visit: _____

1.0 - Environmental Health Issues and Action Summary

The following issues were identified during the Environmental Health Assessment of your home. The issues described below are followed by some specific actions that are recommended to eliminate or minimize the impact an issue may be having on the indoor environmental health of your home. This action plan is intended to provide you with some specific things you can do to that, when completed, should improve the general health of your home's indoor environment and may improve the overall health of your family.

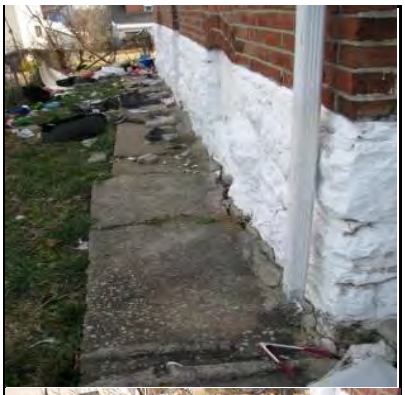
Building Issues and Recommended Actions to take

Photos of Issues

Issue: Splash blocks/extension tubing were missing on downspouts. Downspouts was also observed to be damaged.

Action(s): 1) Repair the broken downspout and install extension tubing on all downspouts to assure that water is draining away from home.

2) Clean out gutters and downspouts periodically to remove debris to allow proper water drainage.



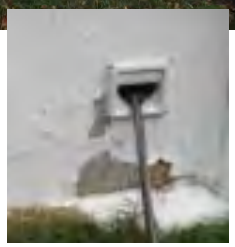
Issue: A lot of trash and broken glass pieces were observed on side and back of the home. Family reported mice and cockroach issues inside the home.

Action(s): 1) It is recommended to remove and dispose of all the trash and unwanted items from around the home in order to keep pests and odors away from home.

2) Safely remove and dispose of all of the glass pieces around the home in order to prevent injuries from occurring.

Issue: Visible gap was observed around back door of home. Holes were observed on basement windows of the home. Dryer vent opening was not sealed.

Action(s): Install weather stripping around the back door, seal and close all gaps with a proper sealant in order to prevent unwanted air, moisture and pests from entering home.



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Building Issues and Recommended Actions to take

Photos of Issues

Issue: Flaking paint was observed on exterior stairs and on front porch support columns. Knowing that the house was built around the early 1900s it is possible that lead based paint may also be on some interior walls .

Action(s): 1) Since the home was built prior to 1978, there are concerns of lead-based paint in home. Lead paint "dust" is typically the exposure source for many young children due to them crawling on the floors and then placing fingers and hands in mouth. Keeping floors, windows, and around windows free of dust is recommended by "damp" dusting

2) If concerned about lead-based paint, it is recommended to have all surfaces in the home tested for lead by a licensed risk assessor. **If lead is detected and determined that it needs to be removed, lead-safe work practices should be used at all times.** Contact the Kansas City Missouri Health Department's Project Lead Safe KC program at 816-513-6008.

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Mechanical Issues and Recommended Actions to take

Photos of Issues

Issue: Dust was observed on furnace system. Very high levels of fine airborne particles and mold spores were measured throughout the home. Low air changes per hour was also measured from vents throughout the home. There was no filter in the furnace and fiber glass filters were observed to be stored around the furnace. Items were also observed to be stored around the furnace.

Action(s):

1) A licensed Heating, Ventilation, and Air Conditioning (HVAC) expert should assess the furnace to determine why it is not functioning. The HVAC expert should determine if the furnace need to be balanced so that filtered air is evenly distributed throughout the home. This should help improve the air quality throughout the home and decrease the amount of potential contaminants in the spaces.

2) Use a pleated filter in the furnace that has a Minimum Efficiency Rating Value (MERV) rating of at least 8 or a performance rating value filter of 1000 in order to capture smaller particles that are typically breathed in easily, which may cause increased upper respiratory infections.

3) Change the pleated furnace filter every 3 months or per manufacturer's recommendations.

4) Remove clutter from around the furnace in order to prevent the risk of fire hazard and also to allow easy access to change the furnace filter.

5) Clean areas on and around the furnace by "damp dusting" or with a vacuum equipped with a High Efficiency Particulate Air (HEPA) filter to decrease the chances of pulling any unwanted dust or dirt into the HVAC system and possibly distributing it throughout the home. Refer to the safer cleaning book for ideas on how to create non-toxic cleaners.

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Mechanical Issues and Recommended Actions to take

Photos of Issues

Issue: Main junction box was missing a cover in the basement. A notice of hazardous condition form was issued to the family at the time of the assessment.

Action(s): It is recommended to have a certified electrician install a cover on the main junction box to prevent the risk of electrical shock hazards.

Issue: Gas stove was not exhausted to the outside. Gas leak was detected from the kitchen stove; the family was given a hazardous condition form for this issue.

Action(s): 1) It is recommended to have someone repair or replace the gas stove. A licensed plumber should address the gas leak as well. This is a health and safety concern that needs to be addressed immediately .

2) Install an exhaust fan either on the outside wall or above the stove to prevent unwanted carbon monoxide (CO) gas from building-up in the home and to exhaust cooking odors, particles, and moisture out of the home.

3) If installing a kitchen exhaust is not possible then open windows and operate fans during cooking activities.

Issue: Electrical outlets and light switches were loose and/or some were missing a faceplate throughout the home. Plug covers were also observed to be missing.

Action(s): 1) Have a certified electrician install a cover on the electrical outlet to prevent the risk of electric shock hazards.

2) A plug cover should be placed into all unused electrical outlets in order to prevent small children from sticking objects into the outlet, which can be an electrical shock hazards.

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Mechanical Issues and Recommended Actions to take

Photos of Issues

Issue: Water leak from the upstairs bathroom toilet was reported at the time of the assessment. Family currently does not use this bathroom due to this issue. This bathroom was not assessed.

Action(s): It is recommended to have a licensed plumber assess and make the necessary repairs to stop any water leaks in the bathroom so that the family can have access to this particular bathroom.

Issue: Dryer was not exhausted to the outside of the home. Bottom cover was observed to be loose on the washer.

Action(s): 1) It is recommended to have a licensed HVAC expert install a safe and efficient dryer vent so that the dryer exhausts outside the home safely in order to prevent fire hazard, condensation and possible mold growth.

2) It is also recommended to clean the lint from the walls, dryer and dryer vent ducting regularly to prevent a potential fire hazard.

3) Properly replace/install and secure the bottom panel to the washer in order to prevent safety hazards from occurring.

Issue: Exhaust fan/light fixture was loose and missing a cover in the bathroom located on the first floor.

Action(s): 1) Re-attach and install a cover on the exhaust fan in the bathroom

2) Operate fan during, and for 15 - 20 minutes after taking shower/bath to help decrease the humidity level during and to prevent mold and bacteria growth.

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Mechanical Issues and Recommended Actions to take

Photos of Issues

Issue: Corrosion and rust was observed on the base of hot water heater located in the basement of the home.

Action(s): A licensed Heating, Ventilation, and Air Conditioning (HVAC) professional should assess the hot water heater to replace or make necessary repairs in order to prevent future moisture issues and other safety hazards from occurring.

Issue: No supply or return vents were observed in the bathroom located on the first floor.

Action(s): Install ductwork to the bathroom on the floor to ensure that fresh air is introduced and to promote air circulation.

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Issues in the Home and Recommended Actions to take

Photos of Issues

Issue: Curtains, wall to wall stained carpeting in master bedroom was present and excess dust on carpeting, window sills and floor was observed throughout the house.

Action(s): 1) Vacuum all surface flooring, upholstered furniture, and window areas routinely with a vacuum equipped with a High Efficiency Particulate Air (HEPA) filter (provided by the healthy home program). The HEPA filter will help decrease the amount of allergens and particles that may be present, and not allow them to be reintroduced into the air.

2) Ideally, removing the stained carpeting in the bedrooms and switching to a hard surface flooring is recommended. This type of floor harbors less allergens and is easier to maintain.

3) Launder all cloth window coverings present every 4-6 months to decrease the amount of dust and allergens that may be present. Vacuum cloth window coverings in between laundering to help maintain them and decrease dust and allergens on a weekly basis.

4) "Damp dust" surfaces in the home with a damp cloth. This will help decrease the amount of dust and particles you stir up into the air and possibly exposing the child or sensitive individuals to. Refer to the safer cleaning book for recipes on non-toxic cleaning products.

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Issues in the Home and Recommended Actions to take

Photos of Issues

Issue: No carbon monoxide (CO) detector was observed in the home - (Healthy Home Program provided one CO detector during initial assessment).

Action(s): 1) It is recommended to place a CO detector between the sleeping areas of the home and all gas combustion sources.

2) Test CO detectors once a month and change batteries twice a year during daylight savings time.

3) If CO detector alarms, the family should exit the home safely and call the fire department/gas company to have the issue addressed.

Issue: Cockroaches were observed throughout the home .

Action(s): 1) It is recommended to use Integrated Pest Management (IPM) in order to reduce the population of cockroaches that are present by removing trash, picking up any food and water when not using them to also prevent pest access and contamination of those items.

2) It is recommended to place all bulky food items including pet food items in storage containers with reseal-able lids to prevent pest from gaining access to those items.

3) Seal any cracks and gaps that would allow insects and rodents to enter the home.

4) Launder any clothes and other items in hot (130 F) water, that are easily cleaned, to destroy any cockroach and other allergens that may be present.

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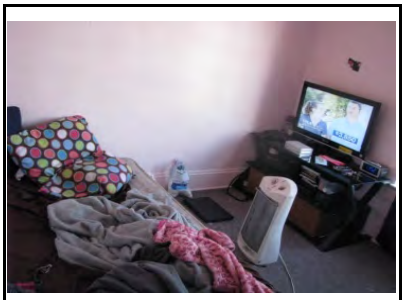
Issues in Each Room and Recommended Actions to take

Photos of Issues

Room: **Master Bedroom**

Issue: High levels of cat and rodent allergens and low levels of cockraoch allergens were detected in the dust sample collected from the child's bedroom floor. Low levels of dustmites were also measured from the dust collected from the mattress that was placed directly on the floor.



Action(s): 1) Routinely vacuum all home carpeting with vacuum equipped with a High Efficiency Particulate Air (HEPA) filter (provided by Healthy Home Program.). This will help decrease the amount of allergens and particles that may be present, and not allow them to be reintroduced into the air.

2) Ideally, removing the stained carpeting and switching to a hard surface flooring is recommended. This type of floor harbors less allergens and is easier to maintain. If carpeting cannot be removed **then steam clean carpeting to denature the allergens present.**

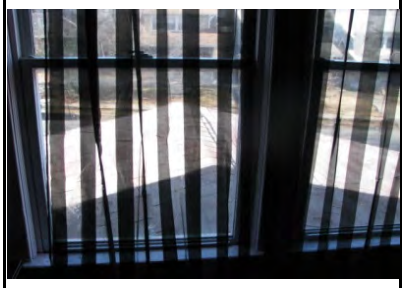
3) Remove the bed from the floor and place it on a bed stand in order to create a barrier between the bed and the floor where allergens are present.

4) It is recommended to use dust mite mattress encasements on the child's bedding to create a barrier between the child and the mattress and box spring where dust mites live.

5) Wash bedding in hot (130 F) water to destroy the allergens that may be present and maintain relative humidity between 30 % - 50% if possible, to keep dust mites from populating.

Room: **Upstairs Bedrooms**

Issue: No window guards on second story windows. Mom reports that children has climbed onto the roof located directly outside of the window in the past. There is also a child that is less than 7 years old in the home.



Action(s): Install window guards on bedroom windows to protect child from accidental falls. The spacing between the window guards and the window sill should not exceed a 4 inch gap. If the window is a casement, the entire opening should be guarded by the window guard with no gaps present. The correct window guard should be selected for the type of window it is being used on. Adults and older children **should be able to access the window in case of an emergency.**

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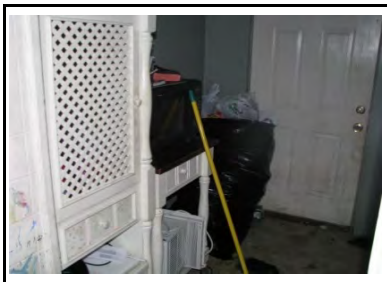
Issues in Each Room and Recommended Actions to take

Photos of Issues

Room: **Kitchen**

Issue: Large trash bag was observed to be full and stored in the kitchen area. Cockroaches were also observed in this area.

Action(s): Replace the big trash bag with one tall kitchen trash can with a lid (provided by the Healthy Home Program) to be stored in the kitchen area only. Take out trash daily instead of allowing trash to gather inside the home for long periods of time in order to decrease odors, clutter, and keep pests from entering the home.



Room: **Kitchen.**

Issue: Pesticide container was observed to be stored next to food item on top of refrigerator.

Action(s): 1) Keep chemicals in a designated area away from all consumable food, drinks, and any young children. Cross contamination can occur when storing chemicals and cleaning products close to food and drink items.

2) Both Medications and chemicals can be hazardous to young children if stored within reach or in easily accessible locations. Keep all medications and chemicals in a designated locked cabinet or out of reach of young children to prevent any hazardous exposures or accidental poisonings from occurring.

Room: **Kitchen**

Issue: No doors were present on cabinets in kitchen.

Action(s): 1) It is recommended to install missing cabinet doors to keep pests from food items that are stored in cabinets.

2) Install safety latches or locks on cabinets where chemicals or medicines are stored to prevent the risk of chemical poisonings.

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Issues in Each Room and Recommended Actions to take

Photos of Issues

Room: **Living Room**

Issue: Broken glass was observed to be stored in the living room.

Action(s): Safely remove the broken glass in order to prevent safety hazards and injuries from occurring.

Room: **Basement**

Issue: A lot of clutter, building materials, debris and dust were observed in the basement.

Action(s): 1) Remove all upholstered furniture, unwanted items and minimize clutter in the basement to allow easy cleaning and to prevent mold growth on items.

2) Store all wanted items in the basement in totes with resalable lids and place on shelving off of the floor.

5) Remove and dispose of all unwanted building materials from home in order to prevent mold growth and dust accumulation.

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Issues and Owner/Landlord Recommended Actions to take

Issue: Splash blocks/extension tubing were missing on downspouts. Downspouts was also observed to be damaged.

Action(s): 1) Repair the broken downspout and install extension tubing on all downspouts to assure that water is draining away from home.

2) Clean out gutters and downspouts periodically to remove debris to allow proper water drainage.

Issue: Visible gap was observed around back door of home. Holes were observed on basement windows of the home. Dryer vent opening was not sealed.

Action(s): Install weather stripping around the back door, seal and close all gaps with a proper sealant in order to prevent unwanted air, moisture and pests from entering home.

Issue: Flaking paint was observed on exterior stairs and on front porch support columns. Knowing that the house was built around the early 1900s it is possible that lead based paint may also be on some interior walls .

Action(s): 1) Since the home was built prior to 1978, there are concerns of lead-based paint in home. Lead paint "dust" is typically the exposure source for many young children due to them crawling on the floors and then placing fingers and hands in mouth. Keeping floors, windows, and around windows free of dust is recommended by "damp" dusting

2) If concerned about lead-based paint, it is recommended to have all surfaces in the home tested for lead by a licensed risk assessor. If lead is detected and determined that it needs to be removed, lead-safe work practices should be used at all times. Contact the Kansas City Missouri Health Department's Project Lead Safe KC program at 816-513-6008.

Photos of Issues

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Issues and Owner/Landlord Recommended Actions to take

Photos of Issues

Issue: Main junction box was missing a cover in the basement. A notice of hazardous condition form was issued to the family at the time of the assessment.

Action(s): It is recommended to have a certified electrician install a cover on the main junction box to prevent the risk of electrical shock hazards.

Issue: Gas stove was not exhausted to the outside. Gas leak was detected from the kitchen stove; the family was given a hazardous condition form for this issue.

Action(s): 1) It is recommended to have someone repair or replace the gas stove. A licensed plumber should address the gas leak as well. This is a health and safety concern that needs to be addressed immediately .

2) Install an exhaust fan either on the outside wall or above the stove to prevent unwanted carbon monoxide (CO) gas from building-up in the home and to exhaust cooking odors, particles, and moisture out of the home.

3) If installing a kitchen exhaust is not possible then open windows and operate fans during cooking activities.

Issue: Electrical outlets and light switches were loose and/or some were missing a faceplate throughout the home. Plug covers were also observed to be missing.

Action(s): 1) Have a certified electrician install a cover on the electrical outlet to prevent the risk of electric shock hazards.

2) A plug cover should be placed into all unused electrical outlets in order to prevent small children from sticking objects into the outlet, which can be an electrical shock hazards.

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1.0 - Environmental Health Issues and Action Summary

The following issues were identified during the Environmental Health Assessment of your home. The issues described below are followed by some specific actions that are recommended to eliminate or minimize the impact an issue may be having on the indoor environmental health of your home. Due to the nature of these issues, the owner, landlord, or property manager may be responsible for making these repairs or changes. This part of the action plan is intended to provide them with some specific things they can do that, when completed, should improve the general health of your home's indoor environment and may improve the overall health of your family.

Issues and Owner/Landlord Recommended Actions to take

Photos of Issues

Issue: Exhaust fan/light fixture was loose and missing a cover in the bathroom located on the first floor.

Action(s): 1) Re-attach and install a cover on the exhaust fan in the bathroom

2) Operate fan during, and for 15 - 20 minutes after taking shower/bath to help decrease the humidity level during and to prevent mold and bacteria growth.

Issue: Corrosion and rust was observed on the base of hot water heater located in the basement of the home.

Action(s): A licensed Heating, Ventilation, and Air Conditioning (HVAC) professional should assess the hot water heater to replace or make necessary repairs in order to prevent future moisture issues and other safety hazards from occurring.

Issue: No supply or return vents were observed in the bathroom located on the first floor.

Action(s): Install ductwork to the bathroom on the floor to ensure that fresh air is introduced and to promote air circulation.

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2.0 Building Assessment:

EHA ID #: _____ Date of Site Visit: _____

Roof

	OK	C	TA	NA	Comments	Score
Surface intact				0	Unable to assess	
No occupant reported/visible leaks		2			In living room	50
No evidence of water damage	3					100
Drip edge condition	3					100
Flashing condition				0	Unable to assess	
Chimney flashing condition				0	Unable to assess	
Ventilation present				0	Unable to assess	
	3	2	1			

Roof Score: 83

Exterior Siding

	OK	C	TA	NA	Comments	Score
Surface condition	3					100
No flaking paint	3					100
No leaking/moisture retention	3					100
Weatherized w/ no visible gaps	3					100
	3	2	1		*Note any moisture meter readings	

Exterior Siding Score: 100

Guttering

	OK	C	TA	NA	Comments	Score
Properly attached and sealed	3					100
No flaking paint	3					100
No leaking/moisture retention	3					100
Downspouts condition		2			Little short	50
Splash block/tile condition		2			Missing	50
	3	2	1			

Guttering Score: 80

Foundation

	OK	C	TA	NA	Comments	Score
No visible cracks	3					100
No reported/visible leaks		2			Few side of house	50
Weatherized w/ no visible gaps	3					100
No flaking paint on wall surface	3					100
No crawlspace open to living space	3					100
If Basement w/ floor						
No visible cracks	3					100
No seepage / standing water	3					100
Floor drain functioning properly	3					100
No flaking paint on floor	3					100
	3	2	1		*Note any moisture meter readings	NA

Foundation Score: 94

Exterior Doors/Windows/Steps

	OK	C	TA	NA	Comments	Score
Surface condition	3					100
No flaking paint	3					100
No leaking/moisture retention	3					100
Weatherized / No visible gaps			1		Hole & gap basement window	0
Outside stairs conditions	3					100
	3	2	1			

Exterior Doors and Windows Score: 80

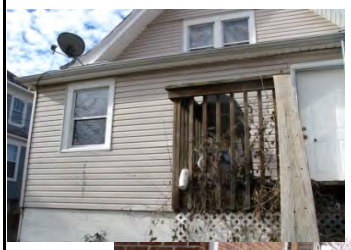
Construction / Remodeling

	>5	>4	>3	>2	>1	NA	% of home affected & location	Score
Outside							How many months since work was completed?	
Roof repair						0	0	NA
Siding/Wall replacement						0	0	NA
Painting						0	0	NA
Inside								
Foundation repair						0	0	NA
Wall replacement						0	0	NA
Door replacement						0	0	NA
Window replacement						0	0	NA
Kitchen/Bath remodeling						0	0	NA
Room remodeling						0	0	NA
Plumbing replacement						0	0	NA
Painting						0	0	NA
Floor sanding						0	0	NA
Floor finishing						0	0	NA
Floor installation						0	0	NA

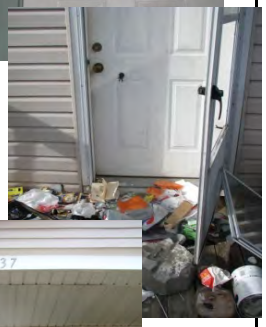
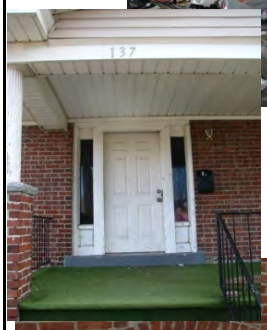
Comments:

Construction/Remodeling Score: NA

Photos of Issues



2.0 Mechanical Assessment:

EHA ID #: _____ Date of Site Visit: _____

Furnace System Type: _____

	OK	C	TA	NA	Comments	Score
Main box intact	3					100
Exhaust properly attached & sealed	3				*Note CO readings:	100
Exhaust system works (neg. flow)	3				*Spillage test passed: Pass √	100
No dust covered components		2			Little dust	50
Returns properly attached and sealed	3					100
Supplies properly attached and sealed	3					100
No suspect material	3					100
Functioning filter system				0	*Unable to assess due*	
Filter condition				0	*to items around unit.*	
Correct filter size			1		No filter	0
Filter properly seated and sealed		2			New fiberglass filter observed	50
Filter changed twice/yr (min)	3					100
	3	2	1			

Furnace Filter Size 20 X 25X1 **Furnace System Score:** 80

Humidifier

	OK	C	TA	NA	Comments	Score
Properly attached & sealed				0		
No reportede/visible leaks				0		
No suspect mold visible				0		
Water supply line connected properly				0		
	3	2	1			

Humidifier Score: NA

Central Air

	OK	C	TA	NA	Comments	Score
No reported/visible leaks	3					100
Condition of coolant line				0	Unable to assess	
Condition of condensate hose				0	Unable to assess	
Condensate hose extends into drain				0	Unable to assess	
	3	2	1			

Central Air Score: 100

Water Heater Type: _____

	OK	C	TA	NA	Comments	Score
No reported/visible leaks		2			Corrosion/rust on bottom of heate	50
Condition of pressure relief valve	3					100
Water temp set ≤ 120°F			1		Measured temp (°F): 131F	0
Steel or brass gas line	3					100
Exhaust attached properly	3				*Note CO readings:	100
Exhaust system works (neg. flow)	3				*Spillage test passed: Pass √	100
	3	2	1		*Note any moisture meter readings	

Water Heater Score: 75

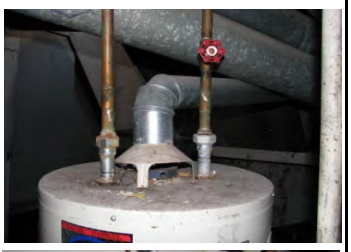
Home Plumbing

	Supply OK	C	TA	NA	Score	Waste OK	C	TA	NA	Score
Bathroom										
Main										
No reported/visible leaks	3				100	3				100
Line/Pipe condition	3				100	3				100
Operating properly	3				100	3				100
Kitchen Sink					Score: 100					Score: 100
No reported/visible leaks	3				100	3				100
Line/Pipe condition	3				100	3				100
Operating properly	3				100	3				100
Tub/Shower					Score: 100					Score: 100
No reported/visible leaks	3				100	3				100
Line/Pipe condition	3				100	3				100
Operating properly	3				100	3				100
Toilet **					Score: 100					Score: 100
No reported/visible leaks			1		0			1		0
Line/Pipe condition				0					0	
Operating properly				0					0	
Sink					Score: 0					Score: 0
No reported/visible leaks	3				100	3				100
Line/Pipe condition	3				100	3				100
Operating properly	3				100	3				100
	3	2	1		Score: 100	3	2	1		Score: 100

Plumbing **Supply Score:** 80 **Waste Score:** 80

Comments ** Upstairs bathroom

Photos of Issues



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2.0 Appliance Assessment:

EHA ID #: Date of Site Visit:

Stove Type: Gas	OK	C	TA	NA	Comments	Score
Burners/oven operating properly			1		*Rangetop CO readings: 0	0
Gas stoves - No CO detected	3				*Oven CO readings: 0	100
Steel or brass gas line	3					100
Working exhaust system	3				*Note flow results:	100
Exhausted to outside			1		Not exhausted	0
Cord condition				0		
	3	2	1		**Stove Score:**	60

Refrigerator	OK	C	TA	NA	Comments	Score
Unit clear of dust and debris		2			Some debris	50
Pre-1980 - Evaporation pan in place	3					100
	3	2	1		**Refrigerator Score:**	75

Washer	OK	C	TA	NA	Comments	Score
Water draining properly		2			Front loading seal leaks	50
No reported/visible water leaks		2			Front loading seal leaks	50
Cord condition	3					100
	3	2	1		**Washer Score:**	67

Dryer Type: Electric	OK	C	TA	NA	Comments	Score
Steel or brass gas line				0		
Dryer ducting condition			1		Not attached	0
Dryer duct exhausts to outside			1		Not exhausted out	0
Cord condition	3					100
	3	2	1		**Dryer Score:**	33

Window AC	Unit 1 OK	C	TA	NA	Unit 2 OK	C	TA	NA	Describe specific issues	Unit 1	Unit 2
Operating correctly	3							0	1 total	100	
No reported/visible water leaks	3							0		100	
Cord condition	3							0		100	
Filter condition	3							0		100	
Tilted to drain outside	3							0		100	
Evaporator pan drain working	3							0		100	
	3	2	1		3	2	1		**Window Unit 1 Score:**	100	
									Window Unit 2 Score:	NA	

Air Cleaner	OK	C	TA	NA	Comments	Score
Condition of air cleaner				0		
Appropriate size for location				0		
Allergen filtration present				0		
Filter condition				0		
Not electronic				0		
	3	2	1		**Air Cleaner Score:**	NA

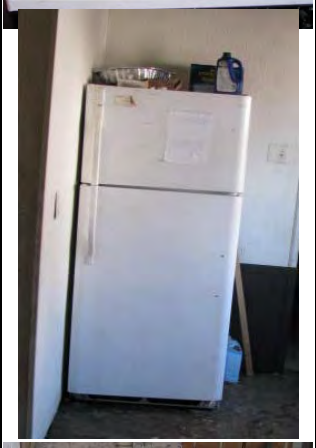
Humidifier	OK	C	TA	NA	Comments	Score
Condition of humidifier				0		
Hot water/steam type humidifier				0		
Rinsed, water changed daily				0		
Disinfected weekly (minimum)				0		
	3	2	1		**Humidifier Score:**	NA

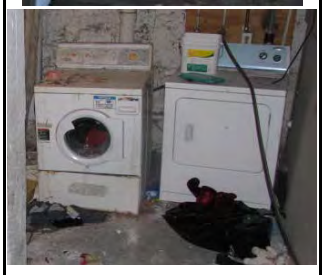
Portable Fans	OK	C	TA	NA	Comments	Score
Operational	3				4 total	100
No accumulated dust on blades		2			Some dust	50
Blade protection in place	3					100
Cord condition	3					100
	3	2	1		**Portable Fan Score:**	88

Space Heaters	OK	C	TA	NA	Comments	Score
No kerosene heaters	3				2 total	100
Tilt safety shut-off switch	3					100
Cord condition		2			Plugged into extension cord	50
	3	2	1		**Space Heaters Score:**	83

Safety Equipment	OK	C	TA	NA	Comments	Score
Working smoke detectors			1		None	0
Working CO detectors			1		None	0
Kitchen fire extinguisher		2			Outdated - One given at EHA	50
Handrails on inside stairs with > 3 steps			1		Missing on main & basement staircase	0
Comments:	3	2	1		**Safety Equipment Score:**	13

Photos of Issues





3.0 EHA Room Survey: Master Bedroom

EHA ID #: _____ Date of Site Visit: _____

Air Flow and Circulation

	OK - Good	Concern	Take Actior	Not Applic.	Description	Score
Working supply vent	3					100
Supply vent open	3					100
Supply vent unobstructed	3					100
If return vent present - working				0		
Return vent(s) unobstructed				0		
If windows present-operational	3					100
Room under (+) pressure				0		
Remarks:	3	2	1		**AF & C Score:**	100

Allergens & Dust

	OK	C	TA	NA	Description	Score
No visible dust			1		On window sill	0
No carpeting present		2			Wall to wall	50
Carpet condition			1		Debris and stains	0
No upholstered furniture	3					100
Upholstered furniture condition				0		
Mattress condition		2			Stains	50
Bedding condition	3					100
No cloth window coverings		2			Curtains	50
No furry/feathered pets in room		2			One dog	50
No clutter	3					100
No reported/visible evid. of rodents		2			Mice	50
No reported/visible evid. of insects		2			Cockroach	50
No trash/debris on surfaces	3					100
Remarks:	3	2	1		**A & D Score:**	58

Moisture Control

	OK	C	TA	NA	Description	Score
No damp smell	3					100
No visible moisture stains	3					100
No reported/visible window leaks	3					100
No room humidifier	3					100
No mold smell	3					100
No suspect visible mold	3					100
Visible mold ranking:	3	2	1		*Note moisture readings:	NA
Area affected: NA sq ft			NA	0	1 <2 2 <10 3 >10 4 >30 5 >100	100
Remarks:					**MC Score:**	100

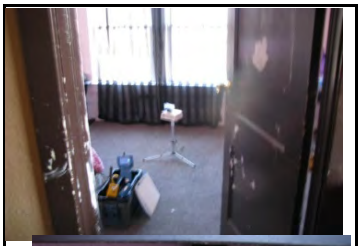
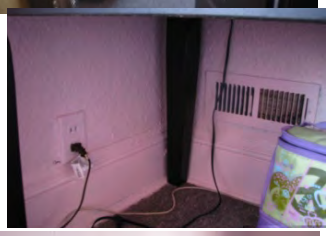
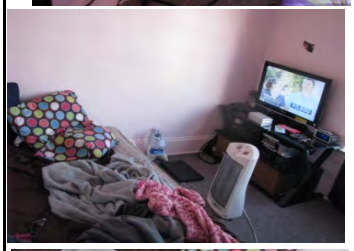
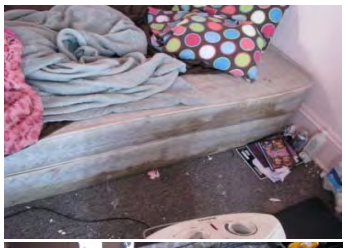
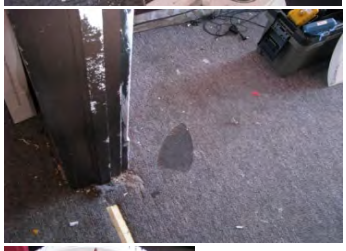
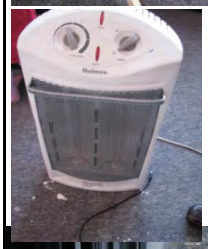
Chemical Exposure

	OK	C	TA	NA	Description	Score
No smoking allowed in room	3					100
No chemical odors	3					100
No air fresheners	3					100
No candles or incense	3					100
No reported/visible chemical supplies	3					100
No flaking paint on any surface	3					100
Flaking Paint Ranking:	3	2	1			
Area affected: NA sq ft			NA	0	1 <1 2 1-2 3 2-4 4 4-10 5 >10	100
Remarks:					**CE Score:**	100

Safety & Injury Prevention

	OK	C	TA	NA	Description	Score
Smoke detector in /near room			1		None	0
CO detector near room			1		Nne	0
No overloaded/small gauge ext. cords	3					100
No loose flooring	3					100
Small Children (<7 yrs old):						
Receptacle plug covers			1		None	0
No blind/curtain cords w/in reach	3					100
Window guards (2nd Floor) present			1		None	0
Medicines out of reach	3					100
Remarks:	3	2	1		**S & IP Score:**	50

Photos of Issues

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3.0 EHA Room Survey: Family Room

EHA ID #: _____ Date of Site Visit: _____

Air Flow and Circulation

	OK - Good	Concern	Take Actior	Not Applic.	Description	Score
Working supply vent	3					100
Supply vent open	3					100
Supply vent unobstructed	3					100
If return vent present - working	3					100
Return vent(s) unobstructed		2			Slightly by couch	50
If windows present-operational				0		
Room under (+) pressure	3					100
Remarks:	3	2	1		**AF & C Score:**	92

Allergens & Dust

	OK	C	TA	NA	Description	Score
No visible dust		2			On floor & window sill	50
No carpeting present	3					100
Carpet condition				0		
No upholstered furniture	3					100
Upholstered furniture condition				0		
Mattress condition				0		
Bedding condition				0		
No cloth window coverings		2			Curtains present	50
No furry/feathered pets in room		2			One dog	50
No clutter	3					100
No reported/visible evid. of rodents			1		Cochroach issue	0
No reported/visible evid. of insects			1		Mice issue	0
No trash/debris on surfaces	3					100
Remarks:	3	2	1		**A & D Score:**	61

Moisture Control

	OK	C	TA	NA	Description	Score
No damp smell	3					100
No visible moisture stains		1			Suspect on ceiling	
No reported/visible window leaks	3					100
No room humidifier	3					100
No mold smell	3					100
No suspect visible mold	3					100
Visible mold ranking:	3	2	1		*Note moisture readings: NA	
Area affected: NA sq ft		NA	0		1 (<2) 2 (<10) 3 (>10) 4 (>30) 5 (>100)	100
Remarks:					**MC Score:**	100

Chemical Exposure

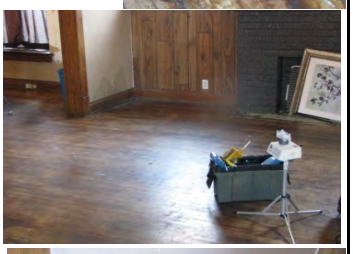
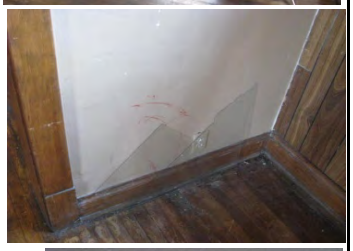
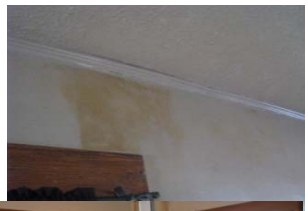
	OK	C	TA	NA	Description	Score
No smoking allowed in room	3					100
No chemical odors	3					100
No air fresheners	3					100
No candles or incense		2			Present	50
No reported/visible chemical supplies	3					100
No flaking paint on any surface	3					100
Flaking Paint Ranking:	3	2	1			
Area affected: NA sq ft		NA	0		1 (<1) 2 (1-2) 3 (2-4) 4 (4-10) 5 (>10)	100
Remarks:					**CE Score:**	92

Safety & Injury Prevention

	OK	C	TA	NA	Description	Score
Smoke detector in /near room			1		None	0
CO detector near room			1		None	0
No overloaded/small gauge ext. cords	3					100
No loose flooring	3					100
Small Children (<7 yrs old):						
Receptacle plug covers			1		None	0
No blind/curtain cords w/in reach	3					100
Window guards (2nd Floor) present	3					100
Medicines out of reach			1		In reach	0
Remarks:	3	2	1		**S & IP Score:**	50

Photos of Issues

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3.0 EHA Room Survey: Kitchen

EHA ID #: _____ Date of Site Visit: _____

Air Flow and Circulation

	OK- Good	Concern	Take Actn	Not Applic.	Description	Score
Working supply vent	3					100
Supply vent open	3					100
Supply vent unobstructed	3					100
If return vent present - working				0		
Return vent(s) unobstructed				0		
Exhaust fan present/operational			1		Re-circulatory only	0
If windows present-operational	3					100
Room under (-) pressure				0		
Remarks:	3	2	1		**AF & C Score:**	80

Allergens & Dust

	OK	C	TA	NA	Description	Score
No visible dust		2			On window sill & counter	50
No carpeting/upholstery present	3					100
No cloth window coverings	3					100
No furry/feathered pets in room		2			One dog	50
No clutter	3					100
Bulk food in containers	3					100
Trash stored in container w/ lid			1		Large trash bag	0
No cracks/gaps around cabinets		2			Missing door on cabinet	50
No reported/visible evid. of rodents			1		Cockroaches observed	0
No reported/visible evid. of insects			1		Mouse issue reported	0
No trash/debris on surfaces	3					100
Remarks:	3	2	1		**A & D Score:**	59

Moisture Control

	OK	C	TA	NA	Description	Score
No damp smell	3					100
No visible moisture stains	3					100
No reported/visible window leaks	3					100
No room humidifier	3					100
No mold smell	3					100
No suspect visible mold	3					100
Visible mold ranking:	3	2	1		*Note moisture readings	NA
Area affected: NA sq ft	NA		0		1 (<2) 2 (<10) 3 (>10) 4 (>30) 5 (>100)	100
Remarks:					**MC Score:**	100

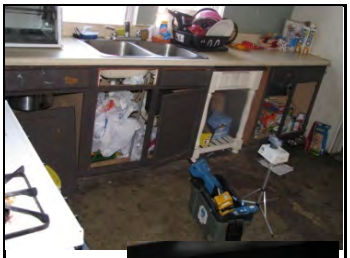
Chemical Exposure

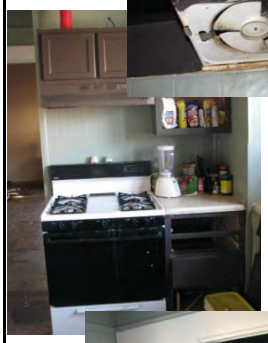
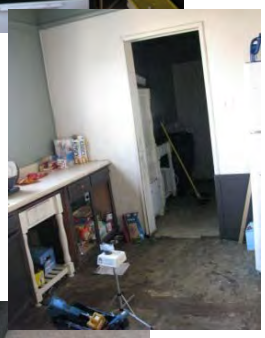
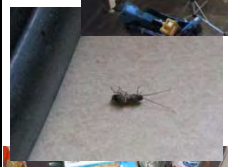
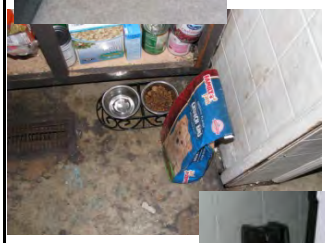
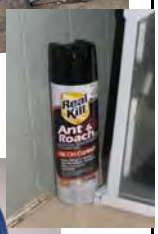
	OK	C	TA	NA	Description	Score
No smoking allowed in room	3					100
No chemical odors	3					100
No air fresheners	3					100
No candles or incense	3					100
No reported/visible chemicals	3					100
Chemicals stored in orig. container	3					100
Food stored away from chemicals			1		Pesticide next to food	0
No flaking paint on any surface	3					100
Flaking Paint Ranking:	3	2	1			
Area affected: NA sq ft	NA		0		1 (<1) 2 (1-2) 3 (2-4) 4 (4-10) 5 (>10)	100
Remarks:					**CE Score:**	88

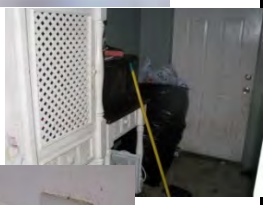
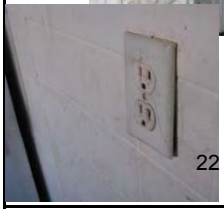
Safety & Injury Prevention

	OK	C	TA	NA	Description	Score
Smoke detector in /near room			1		None	0
CO detector near room			1		None	0
Fire extinguisher present & working			1		None	0
GFCI near water sources	3					100
No overloaded/small gauge ext. cords			1		None	0
Chemicals stored in childproof cabinet	3					100
No loose flooring	3					100
Small Children (<7 yrs old):						
Receptacle plug covers			1		None	0
Cabinet locks on doors				0		
No blind/curtain cords w/in reach	3					100
Medicines out of reach	3					100
Remarks:	3	2	1		**S & IP Score:**	50

Photos of Issues



3.0 EHA Room Survey: Bathroom

EHA ID #: _____ Date of Site Visit: _____

Air Flow and Circulation

	OK- Good	Concern	Take Action	Not Applic.	Description	Score
Working supply vent				0	None present	
Supply vent open				0		
Supply vent unobstructed				0		
If return vent present - working				0		
Return vent(s) unobstructed				0		
Exhaust fan present/operational		2			Needs to be reattached	50
If windows present-operational				0		
Room under (-) pressure				0		
Remarks:	3	2	1		**AQ Score:**	50

Allergens & Dust

	OK	C	TA	NA	Description	Score
No visible dust	3					100
No carpeting/upholstery present	3					100
No cloth window coverings	3					100
No furry/feathered pets in room	3					100
No clutter	3					100
Trash stored in container w/ lid				0		
No cracks/gaps around cabinets	3					100
No reported/visible evid. of rodents			1		Cockroaches	0
No reported/visible evid. of insects			1		Mice	0
No trash/debris on surfaces	3					100
Remarks:	3	2	1		**AF & C Score:**	78

Moisture Control

	OK	C	TA	NA	Description	Score
No damp smell	3					100
No visible moisture stains	3					100
No reported/visible window leaks				0		
No room humidifier	3					100
No mold smell	3					100
No suspect visible mold	3					100
Visible mold ranking:	3	2	1		*Note moisture readings:	NA
Area affected: NA sq ft			NA	0	1 <2 2 <10 3 >10 4 >30 5 >100	100
Remarks:					**MC Score:**	100

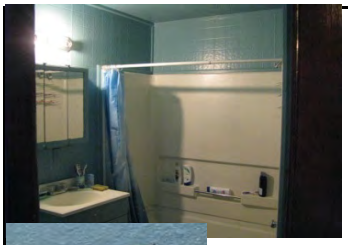
Chemical Exposure

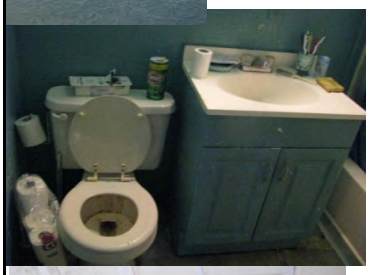
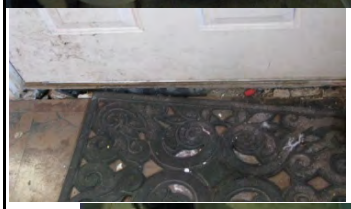
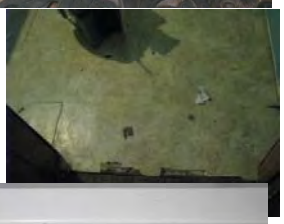
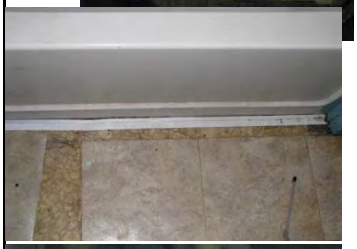
	OK	C	TA	NA	Description	Score
No smoking allowed in room	3					100
No chemical odors	3					100
No air fresheners		2			In closet	50
No candles or incense	3					100
No reported/visible chemicals	3					100
Chemicals stored in orig. container			1		On toilet	0
No flaking paint on any surface	3					100
Flaking Paint Ranking:	3	2	1			
Area affected: NA sq ft			NA	0	1 <1 2 1-2 3 2-4 4 4-10 5 >10	100
Remarks:					**CE Score:**	79

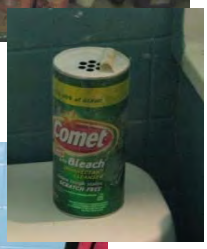
Safety & Injury Prevention

	OK	C	TA	NA	Description	Score
Smoke detector in /near room			1		None	0
CO detector near room			1		None	0
GFCI near water sources			1		None	0
No overloaded/small gauge ext. cords	3					100
Chemicals stored in childproof cab.	3					100
No loose flooring		2				50
Small Children (<7 yrs old):						
Receptacle plug covers			1		None	0
Cabinet locks on doors			1		None	0
No blind/curtain cords w/in reach	3					100
Medicines out of reach	3					100
Remarks:	3	2	1		**S & IP Score:**	45

Photos of Issues






3.0 EHA Room Survey: Basement

EHA ID #: _____ Date of Site Visit: _____

Air Flow and Circulation

	OK- Good	Concern	Take Action	Not Applic.	Description	Score
Working supply vent				0		
Supply vent open				0		
Supply vent unobstructed				0		
No return vent(s) present				0		
No crawlspace open to room				0		
If windows present-operational				0		
Room under (-) pressure				0		
Remarks:	3	2	1		**AF & C Score:**	NA

Allergens & Dust

	OK	C	TA	NA	Description	Score
No visible dust			1		Debris on floor	0
No carpeting/upholstery present			1		Mattress present	0
No cloth window coverings	3					100
No furry/feathered pets in room	3					100
No reported/visible evid. of rodents		2			Cockroaches	50
No reported/visible evid. of insects		2			Mice	50
No clutter			1		Clutter observed	0
No plant pots filled with dirt	3					100
No open/unused cardboard boxes		2			Few	50
No trash/debris on surfaces			1		Observed on floor	0
Remarks:	3	2	1		**A & D Score:**	45

Moisture Control

	OK	C	TA	NA	Description	Score
No damp smell	3					100
No visible moisture stains	3					100
No reported/visible window leaks	3					100
No room humidifier	3					100
No mold smell		2			Little present	50
No suspect mold visible	3					100
Visible mold ranking:	3	2	1		*Note moisture readings:	NA

Area affected: NA sq ft NA 0 | 1 <2 | 2 <10 | 3 >10 | 4 >30 | 5 >100 | 100

Remarks: **MC Score:** 92

Chemical Exposure

	OK	C	TA	NA	Description	Score
No smoking allowed in room	3				Needs batteries	100
No chemical odors	3				None	100
No air fresheners	3					100
No candles or incense	3					100
No reported/visible chemicals	3					100
Chemicals stored in orig. container	3					100
No flaking paint on any surface	3					100
Flaking Paint Ranking:	3	2	1			

Area affected: NA sq ft NA 0 | 1 <1 | 2 1-2 | 3 2-4 | 4 4-10 | 5 >10 | 100

Remarks: **CE Score:** 100

Safety & Injury Prevention

	OK	C	TA	NA	Description	Score
Smoke detector in /near room		2				50
CO detector near room			1			0
GFCI near water sources				0		
No overloadedsmall gauge ext. cords	3					100
Chemicals stored in childproof cab.	3					100
No loose flooring	3					100
Handrails on stairs			1			0
Adequate stairwell lighting	3					100
Small Children (<7 yrs old):						
Receptacle plug covers				0		
Cabinet locks on doors				0		
Remarks:	3	2	1		**S & IP Score:**	64

Photos of Issues

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Appendix A - Scope of Environmental Health Assessment Report

Scope of Work

This environmental health assessment was performed by the Center for Environmental Health (CEH) at Children's Mercy Hospital. Environmental Health Assessments are a limited visual assessment of the structural and mechanical components of the building, and a visual assessment of the rooms and their contents to look for potential sources of environmental contaminants. On-site measurements of indoor air components and sampling for laboratory analysis for indoor contaminants may be performed to support the assessment, if deemed necessary and appropriate by the assessment team. The visual assessment information that has been gathered, along with any on-site measurements and laboratory results, are reviewed and compiled into this assessment report. This report includes a series of environmental health issues/actions summaries that were used to guide the development of an environmental health action plan in order to assist families as they seek actions they can take to try to improve the indoor environmental quality of their home.

This environmental health assessment is provided through the Kansas City Asthma-Friendly Home Partnership (KCAFHP), a Center for Environmental Health (CEH) community collaboration.

It has specific program components that are targeted to provide education and training to specific groups in the Kansas City community. These groups each represent stakeholders in building a comprehensive, community-based approach to indoor environmental health, and asthma education and management. The ultimate goal of this community-based approach is reduction in new cases of asthma and better management by working with the child's primary care physician and reduction of the healthcare burden of pediatric asthma in the Kansas City.

Hypothesis

The hypothesis for this environmental health assessment was that environmental contaminants were present in the home and that they were of sufficient concentration to contribute to symptoms of occupants with chronic health problems. This hypothesis was tested through visual observations, on-site measurements, and if necessary,

Report Disclaimer and Conditions

This report is limited in scope to the information gathered during site reconnaissance and the results of the laboratory analyses of any samples gathered during reconnaissance. It is intended for use by the family who occupies the building. No information regarding the history of the site or its occupancy has been reviewed. There is no warranty or guarantee of the health or safety conditions in the building based on this assessment. Only readily accessible parts of the building were evaluated and only random samples will be taken. Maintenance and repair issues may be discussed, but a detailed survey of any records are not a part of this assessment report. The report may not be considered a compliance inspection or certification for past or present codes or regulations of any kind.

This assessment and report addresses only allergy or asthma provoking substances, respiratory irritants, and other indoor air quality issues. It does not evaluate presence or concentration of radon gas, lead paint, or asbestos. It is not a formal assessment of the presence of rodents, termites, insects, or other infestations. It is not a formal assessment of fire or safety hazards in the building. No claims can be made beyond the limitations of the information reported herein. No warranties, either expressed or implied, apply to the services described hereunder. If you have any questions regarding any part of this report, please feel free to contact the Center for Environmental Health at Children's Mercy Hospitals and Clinics at 816-960-8919 and we will be happy to assist you.

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Appendix B – Photocopies of EHA Authorization, EHA Consent, and Sample Custody Forms

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Appendix C – References Used For This Report

1) American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. Thermal Environmental Conditions for Human Occupancy - ASHRAE Standard (ANSI/ASHRAE 55-2010). Atlanta, Georgia, 1992.

2) American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. Ventilation and Acceptable Indoor Air Quality in Low-Rise Residential Buildings - ASHRAE Standard (ANSI/ASHRAE 62.2-2010). Atlanta, Georgia, 1992.

3) Macher, J. (Ed). "Bioaerosols: assessment and control", American Conference of Governmental Industrial Hygienists (ACGIH), Cincinnati, Ohio. 1999.

4) Environmental Protection Agency (EPA). Building Air Quality: A Guide for Building Owners and Facility Managers. December, 1991.

5) Indoor Environmental Standards Organization, (2nd Edition June 2003) Standards of Practice for the Assessment of Indoor Environmental Quality, Volume 1: Mold Sampling; Assessment of Mold Contamination. Indoor Environmental Standards Organization, Rockville, MD.

6) Spengler, J. D., Samet, J.M., McCarthy, J.F. Indoor Air Quality Handbook. January, 2001.

7) Institute of Inspection, Cleaning, and Restoration Certification (IICRC). Standard and Reference Guide for Professional Water Damage Restoration - ANSI/IICRC S500, April 2006. Vancouver, Washington.

8) International Code Council. International Property Maintenance Code (IPMC), 2012.

9) Burroughs, H.E., Hansen, S. Managing Indoor Air Quality (3), 2004.

10) Prezant, B., Weekes, D.M., Miller, J.D. Recognition, Evaluation, and Control of Indoor Mold. 2008.

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The Bigger Picture

Healthy Housing Solutions Inc.

The Bigger Picture

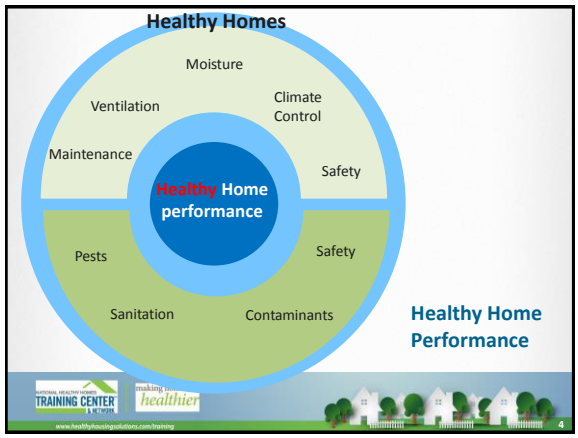
This is the story of Grandma's house . . .

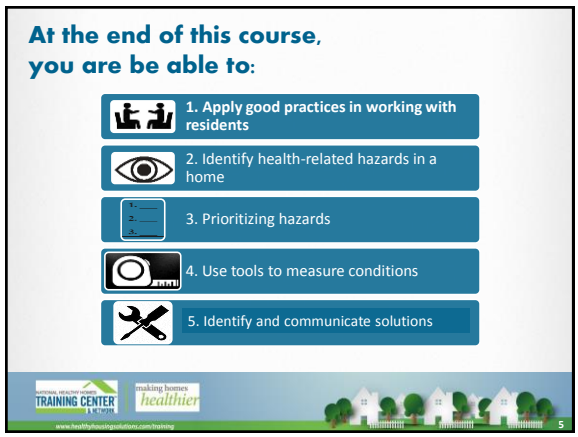
And this is the story of how mold triggered Grandma's and Red's asthma symptoms . . .

Circle Back: Vision

What has changed for you?

What do you see now that was previously "not visible."


Healthy Homes
Moisture
Climate Control
Ventilation
Maintenance
Safety
Healthy Home performance
Pests
Safety
Sanitation
Contaminants
Healthy Home Performance
4


At the end of this course, you are be able to:
1. Apply good practices in working with residents
2. Identify health-related hazards in a home
3. Prioritizing hazards
4. Use tools to measure conditions
5. Identify and communicate solutions
5


Why Do a Healthy Homes Evaluation?
Now, what's motivating you to do this?
6


THANKS!
TRAINING CENTER
making homes
healthier
www.healthyhousingsolutions.com/training
7

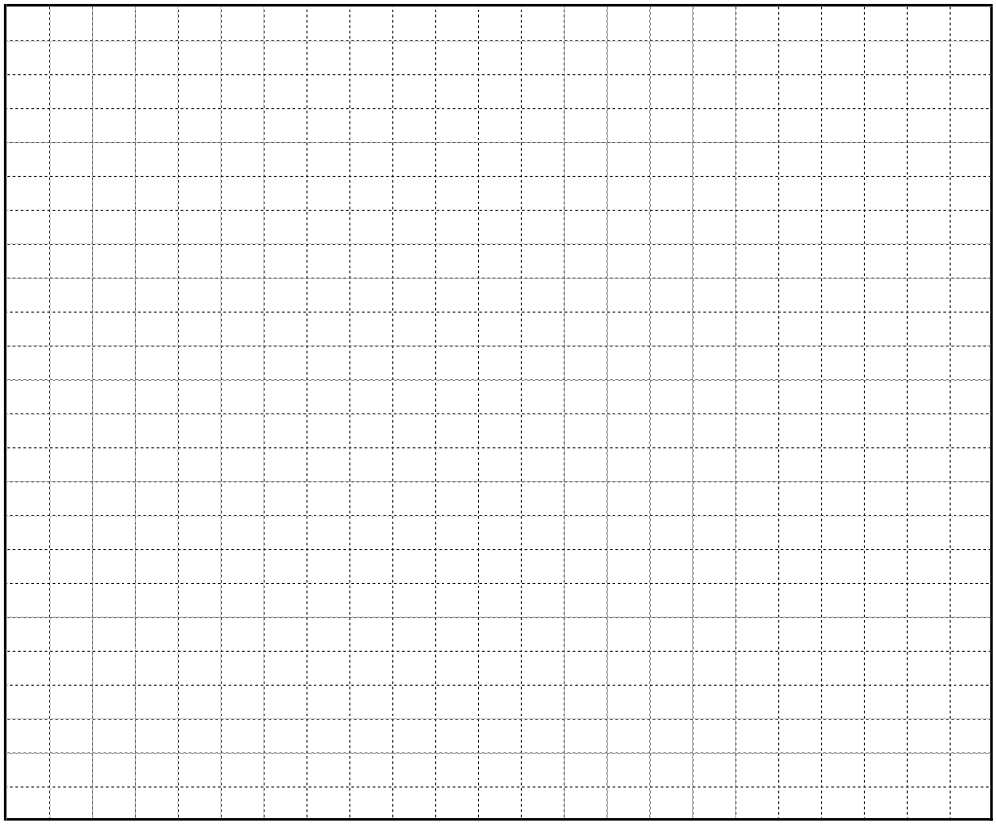
Safe & Healthy Home Assessment

EHA ID #: _____ Date of Site Visit: _____

Name: _____ Phone(s): _____ _____

Address: _____

Site Visit Field Assessment form



Front of House

_____ Compass Direction

General Description of the Site

Primary Ground Cover: ☐ Grass ☐ Dirt ☐ Gravel ☐ Concrete ☐ Other _____

Secondary Ground Cover: ☐ Grass ☐ Dirt ☐ Gravel ☐ Concrete ☐ Other _____

Drainage: ☐ Away from Found. ☐ Toward Found. ☐ F to R ☐ R to F ☐ L to R ☐ R to L

Nearby Pollution Sources

within 500 ft. ☐ Busy Street ☐ Highways ☐ Interstate H. Way ☐ Railroad ☐ Other _____

within 0.25 mi. ☐ Factory ☐ Industrial ☐ Powerplant ☐ Retail ☐ Retail ☐ Other _____

General Description of the Building

Building Location: ☐ Urban ☐ Suburban ☐ Rural ☐ Other _____

Building Type: ☐ House ☐ Duplex ☐ Triplex ☐ Townhome ☐ Other: _____

Approximate Age: ☐ Unknown ☐ Before 1940 ☐ 1940-1959 ☐ 1960-1977 ☐ After 1978

Building Area: _____ ft^2 # of Floors: _____ # of Rooms: _____

Total Number of Windows: _____ Total Number of Entry Doors: _____

Outside Weather Conditions:	Temperature	Relative Humidity	Precipitation

Home Assessor Name(s): _____

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Site Visit Field Assessment form

2.0 Building Assessment:

EHA ID #: _____ Date of Site Visit: _____

Roof

	Yes	No	Not Applic.	What issues were observed?	*Is this a Health/Safety Hazard?* Chronic	Acute	Take Action?
Surface intact							
Any occupant reported/visible leaks							
Any evidence of water damage							
Drip edge condition OK							
Flashing condition OK							
Chimney flashing condition OK							
Ventilation present							

Identified: [ ] [ ]

Exterior Siding

	Yes	No	NA	What issues were observed?	Chronic	Acute	Take Action?
Surface condition OK							
Visible flaking paint							
Any leaks/Moisture retention							
Weatherized w/ no visible gaps							

*Note any moisture meter readings # Identified: [ ]

Guttering

	Yes	No	NA	What issues were observed?	Chronic	Acute	Take Action?
Properly attached and sealed							
Visible flaking paint							
Any leaks/Moisture retention							
Downspouts condition OK							
Splash block/tile condition OK							

*Note any moisture meter readings # Identified: [ ] [ ]

Foundation

	Yes	No	NA	What issues were observed?	Chronic	Acute	Take Action?
Any visible cracks?							
Any occupant reported/visible leaks							
Weatherized w/ no visible gaps							
Any flaking paint on wall surface							
Is crawlspace open to living space?							
If Basement w/ floor							
Any visible cracks?							
Any rprtd/vsbl. seepage/standing water							
Floor drain functioning properly							
Any flaking paint on floor							

*Note any moisture meter readings # Identified: [ ] [ ]

Exterior Doors/Windows/Steps

	Yes	No	NA	What issues were observed?	Chronic	Acute	Take Action?
Surface condition OK							
Visible flaking paint							
Any leaks/Moisture retention							
Weatherized / No visible gaps							
Outside stairs condition OK							

*Note any moisture meter readings # Identified: [ ] [ ]

Home Plumbing

Bathroom

	Supply Yes	Supply No	Supply NA	Supply TA?	Waste Yes	Waste No	Waste NA	Waste TA?	Issues observed?
Main									
Any reported/visible leaks									
Line/Pipe condition OK									
Operating properly									
Kitchen Sink									
Any reported/visible leaks									
Line/Pipe condition OK									
Operating properly									
Tub/Shower									
Any reported/visible leaks									
Line/Pipe condition OK									
Operating properly									
Toilet									
Any reported/visible leaks									
Line/Pipe condition OK									
Operating properly									
Sink									
Any reported/visible leaks									
Line/Pipe condition OK									
Operating properly									

Site Visit Field Assessment form

EHA ID #: _____ Date of Site Visit: _____

2.0 Mechanical Assessment:

Is this a Health/Safety Hazard?

Furnace System Type: _____

	Yes	No	NA	Take Action?	What issues were observed?	Chronic	Acute
Main box intact							
Exhaust properly attached & sealed					*Note CO readings:		
Exhaust system works (neg. flow)					*Spillage test results: Pass____ Fail____		
Dust covered components							
Returns properly attached and sealed							
Supplies properly attached and sealed							
Any suspect material present?							
Filter properly seated and sealed							
Correct filter size							
Pleated filter in use(min. MERV=8)							
Filter condition OK							
Filter changed quarterly (min)							
Furnace Filter Size X					# Identified:		

Humidifier

	Yes	No	NA	TA?	What issues were observed?	Chronic	Acute
Properly attached & sealed							
Any reported/visible leaks							
Any suspect mold visible							
Water supply line connected properly							
					# Identified:		

Central Air

	Yes	No	NA	TA?	What issues were observed?	Chronic	Acute
Any reported/visible leaks							
Condition of coolant line OK							
Condition of condensate hose OK							
Condensate hose extends into drain							
					# Identified:		

Water Heater Type: _____

	Yes	No	NA	TA?	What issues were observed?	Chronic	Acute
Any reported/visible leaks							
Condition of pressure relief valve							
Water temp set ≤ 120°F					Measured Temp. (°F):		
___Steel or ___brass gas line							
Exhaust attached properly					*Note CO readings:		
Exhaust system works (neg. flow)					*Spillage test results: Pass____ Fail____		
					*Note any moisture meter readings # Identified:		

2.0 Appliance Assessment:

Is this a Health/Safety Hazard?

Stove Type: _____

	Yes	No	NA	Take Action?	What issues were observed?	Acute	Chronic
Burners/oven operating properly							
Gas stoves - No CO detected							
___Steel or ___brass gas line							
Working exhaust system							
Exhausted to outside							
Cord condition OK							
					# Identified:		

Washer

	Yes	No	NA	TA?	What issues were observed?		
Water draining properly							
No reported/visible water leaks							
GCFI Installed/working							
Cord condition OK							
					# Identified:		

Dryer Type: _____

	Yes	No	NA	TA?	What issues were observed?	Acute	Chronic
Steel or brass gas line							
Dryer ducting condition							
Dryer duct exhausts to outside							
Cord condition OK							
					# Identified:		

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Site Visit Field Assessment form

3.0 EHA Room Survey: Child's Bedroom EHA ID #: _____ Date of Site Visit: _____

Keep it Ventilated	Yes	No	Not Applic.	What issues were observed?	*Is this a Health/Safety Hazard?* Chronic	Acute	Take Action?
Working supply vent							
Supply vent open							
Supply vent unobstructed							
If return vent present - working							
Return vent(s) unobstructed							
If windows present-operational							
Room under (+) pressure							
				*Note airflow readings	# Identified:		

Keep it Clean	Yes	No	NA	What issues were observed?	Chronic	Acute	Take Action?
Excessive visible dust							
Is carpeting present							
Carpet condition OK							
Upholstered furniture present							
Upholstered furniture condition OK							
Mattress condition OK							
Bedding condition OK							
cloth window coverings present							
Furry/feathered pets allowed in room							
Observed clutter							
Observed trash/debris on surfaces							
					# Identified:		

Keep it Pest-Free	Yes	No	NA	What issues were observed?	Chronic	Acute	Take Action?
Any reported/visible evidence of rodents							
Any reported/visible evidence of insects							
Any food observed in room							
					# Identified:		

Keep it Dry	Yes	No	NA	What issues were observed?	Chronic	Acute	Take Action?
Observed damp smell							
Any visible moisture stains							
Any reported/visible window leaks							
Observed room humidifier							
Any mold smell							
Any observed suspect visible mold							
Visible mold ranking:				*Note any moisture meter readings			

	0	<2 sq.ft.	<10	>10	>30	>100
Area affected:						

					# Identified:		

Keep it Contaminant-Free	Yes	No	NA	What issues were observed?	Chronic	Acute	Take Action?
Is smoking allowed in room							
Observed chemical odors							
Any Observed air fresheners							
Any observed candles or incense							
Any reported/visible chemical supplies							
Any flaking paint on any surface							
Flaking Paint Ranking:							

	0	<1 sq.ft.	1-2	2-4	4-10	>10
Area affected:						

					# Identified:		

Keep it Safe	Yes	No	NA	What issues were observed?	Chronic	Acute	Take Action?
Smoke detector in /near room							
CO detector near room							
Observed overloaded/small gauge ext. cords							
Observed loose flooring							
Small Children (<7 yrs old):							
Receptacle plug covers							
Any blind/curtain cords w/in reach							
Window guards (2nd Floor) present							
Medicines out of reach							
					# Identified:		
					Total Hazards Identified:		

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Site Visit Field Assessment form

3.0 EHA Room Survey: Master Bedroom EHA ID #: _____ Date of Site Visit: _____

Keep it Ventilated

	Yes	No	Not Applic.	What issues were observed?	Is this a Health/Safety Hazard? Chronic	Acute	Take Action?
Working supply vent							
Supply vent open							
Supply vent unobstructed							
If return vent present - working							
Return vent(s) unobstructed							
If windows present-operational							
Room under (+) pressure							

*Note airflow readings # Identified:

Keep it Clean

	Yes	No	NA	What issues were observed?	Chronic	Acute	Take Action?
Excessive visible dust							
Is carpeting present							
Carpet condition OK							
Upholstered furniture present							
Upholstered furniture condition OK							
Mattress condition OK							
Bedding condition OK							
cloth window coverings present							
Furry/feathered pets allowed in room							
Observed clutter							
Observed trash/debris on surfaces							

Identified:

Keep it Pest-Free

	Yes	No	NA	What issues were observed?	Chronic	Acute	Take Action?
Any reported/visible evidence of rodents							
Any reported/visible evidence of insects							
Any food observed in room							

Identified:

Keep it Dry

	Yes	No	NA	What issues were observed?	Chronic	Acute	Take Action?
Observed damp smell							
Any visible moisture stains							
Any reported/visible window leaks							
Observed room humidifier							
Any mold smell							
Any observed suspect visible mold							

Visible mold ranking: *Note any moisture meter readings

	0	<2 sq.ft.	<10	>10	>30	>100
Area affected:						

Identified:

Keep it Contaminant-Free

	Yes	No	NA	What issues were observed?	Chronic	Acute	Take Action?
Is smoking allowed in room							
Observed chemical odors							
Any Observed air fresheners							
Any observed candles or incense							
Any reported/visible chemical supplies							
Any flaking paint on any surface							

Flaking Paint Ranking:

	0	<1 sq.ft.	1-2	2-4	4-10	>10
Area affected:						

Identified:

Keep it Safe

	Yes	No	NA	What issues were observed?	Chronic	Acute	Take Action?
Smoke detector in /near room							
CO detector near room							
Observed overloaded/small gauge ext. cords							
Observed loose flooring							
Small Children (<7 yrs old):							
Receptacle plug covers							
Any blind/curtain cords w/in reach							
Window guards (2nd Floor) present							
Medicines out of reach							

Identified:

Total Hazards Identified:

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Site Visit Field Assessment form

3.0 EHA Room Survey: Family Room EHA ID #: _____ Date of Site Visit: _____

Keep it Ventilated

	Yes	No	Not Applic.	What issues were observed?	*Is this a Health/Safety Hazard?* Chronic	Acute	Take Action?
Working supply vent							
Supply vent open							
Supply vent unobstructed							
If return vent present - working							
Return vent(s) unobstructed							
If windows present-operational							
Room under (+) pressure							
				*Note airflow readings	# Identified:		

Keep it Clean

	Yes	No	NA	What issues were observed?	Chronic	Acute	Take Action?
Excessive visible dust							
Is carpeting present							
Carpet condition OK							
Upholstered furniture present							
Upholstered furniture condition OK							
Mattress condition OK							
Bedding condition OK							
cloth window coverings present							
Furry/feathered pets allowed in room							
Observed clutter							
Observed trash/debris on surfaces							
					# Identified:		

Keep it Pest-Free

	Yes	No	NA	What issues were observed?	Chronic	Acute	Take Action?
Any reported/visible evidence of rodents							
Any reported/visible evidence of insects							
Any food observed in room							
					# Identified:		

Keep it Dry

	Yes	No	NA	What issues were observed?	Chronic	Acute	Take Action?
Observed damp smell							
Any visible moisture stains							
Any reported/visible window leaks							
Observed room humidifier							
Any mold smell							
Any observed suspect visible mold							
Visible mold ranking:				*Note any moisture meter readings			

	0	<2 sq.ft.	<10	>10	>30	>100
Area affected:						

	# Identified:		

Keep it Contaminant-Free

	Yes	No	NA	What issues were observed?	Chronic	Acute	Take Action?
Is smoking allowed in room							
Observed chemical odors							
Any Observed air fresheners							
Any observed candles or incense							
Any reported/visible chemical supplies							
Any flaking paint on any surface							
Flaking Paint Ranking:							

	0	<1 sq.ft.	1-2	2-4	4-10	>10
Area affected:						

	# Identified:		

Keep it Safe

	Yes	No	NA	What issues were observed?	Chronic	Acute	Take Action?
Smoke detector in /near room							
CO detector near room							
Observed overloaded/small gauge ext. cords							
Observed loose flooring							
Small Children (<7 yrs old):							
Receptacle plug covers							
Any blind/curtain cords w/in reach							
Window guards (2nd Floor) present							
Medicines out of reach							
					# Identified:		
					Total Hazards Identified:		

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Site Visit Field Assessment form

3.0 EHA Room Survey: Kitchen EHA ID #: _____ Date of Site Visit: _____

	Yes	No	Not Applic.	What issues were observed?	*Is this a Health/Safety Hazard?* Chronic	Acute	Take Action?
Keep it Ventilated							
Working supply vent							
Supply vent open							
Supply vent unobstructed							
If return vent present - working							
Return vent(s) unobstructed							
Exhaust fan present/operational				Airflow Check: Pass____Fail____			
If windows present-operational							
Room under (-) pressure*							
				*Note airflow readings # Identified:			
Keep it Clean	Yes	No	NA	What issues were observed?	Chronic	Acute	TA?
Excessive visible dust							
Is any carpeting/upholstery present							
Any cloth window coverings present							
Any furry/feathered pets in room							
Observed clutter							
Observed trash/debris on surfaces							
				# Identified:			
Keep it Pest-Free	Yes	No	NA	What issues were observed?	Chronic	Acute	TA?
Any reported/visible evidence of rodents							
Any reported/visible evidence of insects							
Bulk food in containers							
Trash stored in container w/ lid							
Any observed cracks/gaps around cabinets							
				# Identified:			
Keep it Dry	Yes	No	NA	What issues were observed?	Chronic	Acute	TA?
Observed damp smell							
Any visible moisture stains							
Any reported/visible window leaks							
Observed room humidifier							
Any mold smell							
Any observed suspect visible mold							
Visible mold ranking:				*Note any moisture meter readings			
0 <2 sq.ft. <10 >10 >30 >100							
Area affected:							
				# Identified:			
Keep it Contaminant-Free	Yes	No	NA	What issues were observed?	Chronic	Acute	TA?
Is smoking allowed in room							
Observed chemical odors							
Any Observed air fresheners							
Any observed candles or incense							
Any reported/visible chemical supplies							
Chemicals stored in orig. container							
Food stored away from chemicals							
Any flaking paint on any surface							
Flaking Paint Ranking:							
0 <1 sq.ft. 1-2 2-4 4-10 >10							
Area affected:							
				# Identified:			
Keep it Safe	Yes	No	NA	What issues were observed?	Chronic	Acute	TA?
Smoke detector in /near room							
CO detector near room							
Fire extinguisher present & working							
Chemicals stored in childproof cab.							
Water temp set < 120°F							
GFCI near water sources							
No overloaded/small gauge ext. cords							
No loose flooring							
Small Children (<7 yrs old):							
Receptacle plug covers							
Cabinet locks on doors							
No blind/curtain cords w/in reach							
Medicines out of reach							
				# Identified:			
				Total Hazards Identified:			

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Site Visit Field Assessment form

3.0 EHA Room Survey: Bathroom EHA ID #: _____ Date of Site Visit: _____

	Yes	No	Not Applic.	What issues were observed?	*Is this a Health/Safety Hazard?* Chronic	Acute	Take Action?
Keep it Ventilated							
Working supply vent							
Supply vent open							
Supply vent unobstructed							
If return vent present - working							
Return vent(s) unobstructed							
Exhaust fan present/operational				Airflow Check: Pass____ Fail____			
If windows present-operational							
Room under (-) pressure							
				*Note airflow readings # Identified:			
Keep it Clean	Yes	No	NA	What issues were observed?	Chronic	Acute	TA?
Excessive visible dust							
Is any carpeting/upholstery present							
Any cloth window coverings present							
Any furry/feathered pets in room							
Observed clutter							
Observed trash/debris on surfaces							
				# Identified:			
Keep it Pest-Free	Yes	No	NA	What issues were observed?	Chronic	Acute	TA?
Any reported/visible evidence of rodents							
Any reported/visible evidence of insects							
Trash stored in container w/ lid							
Any observed cracks/gaps around cabinets							
				# Identified:			
Keep it Dry	Yes	No	NA	What issues were observed?	Chronic	Acute	TA?
Observed damp smell							
Any visible moisture stains							
Any reported/visible window leaks							
Observed room humidifier							
Any mold smell							
Any observed suspect visible mold							
Visible mold ranking:				*Note any moisture meter readings			
0 <2 sq.ft. <10 >10 >30 >100							
Area affected:							
				# Identified:			
Keep it Contaminant-Free	Yes	No	NA	What issues were observed?	Chronic	Acute	TA?
Is smoking allowed in room							
Observed chemical odors							
Any Observed air fresheners							
Any observed candles or incense							
Any reported/visible chemical supplies							
Chemicals stored in orig. container							
Any flaking paint on any surface							
Flaking Paint Ranking:							
0 <1 sq.ft. 1-2 2-4 4-10 >10							
Area affected:							
				# Identified:			
Keep it Safe	Yes	No	NA	What issues were observed?	Chronic	Acute	TA?
Smoke detector in /near room							
CO detector near room							
Chemicals stored in childproof cab.							
Water temp set ≤ 120°F							
GFCI near water sources							
No overloaded/small gauge ext. cords							
No loose flooring							
Small Children (<7 yrs old):							
Receptacle plug covers							
Cabinet locks on doors							
No blind/curtain cords w/in reach							
Medicines out of reach							
				# Identified:			
				Total Hazards Identified:			

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Site Visit Field Assessment form

3.0 EHA Room Survey: Basement EHA ID #: _____ Date of Site Visit: _____

Keep it Ventilated

	Yes	No	Not Applic.	What issues were observed?	Is this a Health/Safety Hazard? Chronic	Acute	Take Action?
Working supply vent							
Supply vent open							
Supply vent unobstructed							
No return vent(s) present							
No crawlspace open to room							
If windows present-operational							
Room under (-) pressure							

*Note airflow readings

Identified:

Keep it Clean

	Yes	No	NA	What issues were observed?	Chronic	Acute	TA?
Excessive visible dust							
Is any carpeting/upholstery present							
Any cloth window coverings present							
Any furry/feathered pets in room							
Observed clutter							
Observed plant pots filled with dirt							
Observed open/unused cardboard boxes							
Observed trash/debris on surfaces							

Identified:

Keep it Pest-Free

	Yes	No	NA	What issues were observed?	Chronic	Acute	TA?
Any reported/visible evidence of rodents							
Any reported/visible evidence of insects							
Bulk food in containers							
Trash stored in container w/ lid							
Any observed cracks/gaps around cabinets							

Identified:

Keep it Dry

	Yes	No	NA	What issues were observed?	Chronic	Acute	TA?
Observed damp smell							
Any visible moisture stains							
Any reported/visible window leaks							
Observed room humidifier							
Any mold smell							
Any observed suspect visible mold							

Visible mold ranking: *Note any moisture meter readings

	0	<2 sq.ft.	<10	>10	>30	>100
Area affected:						

Identified:

Keep it Contaminant-Free

	Yes	No	NA	What issues were observed?	Chronic	Acute	TA?
Is smoking allowed in room							
Observed chemical odors							
Any Observed air fresheners							
Any observed candles or incense							
Any reported/visible chemical supplies							
Chemicals stored in orig. container							
Any flaking paint on any surface							

Flaking Paint Ranking:

	0	<1 sq.ft.	1-2	2-4	4-10	>10
Area affected:						

Identified:

Safety & Injury Prevention

	Yes	No	NA	What issues were observed?	Chronic	Acute	TA?
Smoke detector in /near room							
CO detector near room							
Chemicals stored in childproof cab.							
GFCI near water sources							
No overloaded/small gauge ext. cords							
No loose flooring							
Handrails on stairs (>3 steps)							
Adequate stair lighting							
Small Children (<7 yrs old):							
Receptacle plug covers							
Cabinet locks on doors							

Identified:

Total Hazards Identified:

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Site Visit Field Assessment form

5.0 EHA Attached Structure Assessment

EHA ID #: _____ Date of Site Visit: _____

Attached Garage

Keep it Ventilated	Yes	No	Not Applic.	What issues were observed?	Is this a Health/Safety Hazard? Chronic	Acute	Take Action?
Is crawlspace open to room							
Garage Door Condition OK							
Any openings to living space							
Any return vent(s) present							
Room under (-) pressure*							
				*Note airflow readings	# Identified:		

Keep it Clean	Yes	No	NA	What issues were observed?	Chronic	Acute	TA?
Any reported/visible evidence of rodents							
Any reported/visible evidence of insects							
Observed open/unused cardboard boxes							
Any observed trash/debris/clutter							
				# Identified:			

Keep it Dry	Yes	No	NA	What issues were observed?	Chronic	Acute	TA?
Observed damp smell							
Any visible moisture stains							
Any mold smell							
Any observed suspect visible mold							
Visible mold ranking:				*Note any moisture meter readings			
0 <2 sq.ft. <10 >10 >30 >100							
Area affected:							
				# Identified:			

Keep it Contaminant-Free	Yes	No	NA	What issues were observed?	Chronic	Acute	TA?
Is smoking allowed in room							
Any reported/observed idling vehicles							
Observed chemical odors							
Any reported/visible chemicals							
Chemicals stored in orig. container							
Observed flaking paint on any surface							
				# Identified:			

Keep it Safe	Yes	No	NA	What issues were observed?	Chronic	Acute	TA?
Chemicals stored in childproof cab.							
Any overloaded/small gauge ext. cords							
Fire Extinguisher present/working							
Adequate stair lighting							
				# Identified:			

Porches/Decks

Keep it Clean & Pest-Free	Yes	No	NA	What issues were observed?	Chronic	Acute	TA?
Any reported/visible evidence of rodents							
Any reported/visible evidence of insects							
An observed open/unused cardboard boxes							
Any observed trash/debris/clutter							
				# Identified:			

Keep it Dry	Yes	No	NA	What issues were observed?	Chronic	Acute	TA?
Any visible moisture stains							
Any Visible Leaks*							
Observed mold smell							
Any observed suspect visible mold							
				*Note any moisture meter readings # Identified:			

Keep it Contaminant-Free	Yes	No	NA	What issues were observed?	Chronic	Acute	TA?
Any observed chemical odors							
Any reported/visible chemicals							
Chemicals stored in orig. container							
Any flaking paint on any surface							
Flaking Paint Ranking:							
0 <1 sq.ft. 1-2 2-4 4-10 >10							
Area affected:							
				# Identified:			

Keep it Safe	Yes	No	NA	What issues were observed?	Chronic	Acute	TA?
Any Observed Loose Flooring							
Handrails on Stairs							
Adequate Stair lighting							
				# Identified:			

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Site Visit Field Assessment form

3.0 House/Floor/Room Plan Drawings

EHA ID #: _____ Date: _____

Items to be included on floor plan drawing:

* Smoke tube applicable doorways
* Measure and note ft^2 and ft^3 for each room assessed
* Note locations for supply, return, and exhaust vents
* Note room contents (tables, couches, dressers, etc.)
* Note locations of moisture sources (sinks, toilets, W/D, etc.)
* Note locations of "issues"

Issues Key

F -	Fragranced products
C -	Chemical products
MS -	Moisture stain
SM -	Suspect mold
FP -	Flaking paint
SH -	Safety hazard

Compass Direction: _____

	Door 1	Door 2	Door 3	Door 4	Door 5	Door 6	Door 7	Door 8	Door 9	Door 10
Pressure Readings/										
Smoke Tube										
Measurements										

Home Assessor Name(s): _____

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Site Visit Field Assessment form

4.0 Field Notes and Calculations

EHA ID #: _____ Date: _____

Home Assessor Name(s): _____

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Environmental Measurement Worksheet

Student Name: _____ Date: _____

Data Collection Practice: With the instruments you now have basic procedures for we will collect some simple measurements in order to practice measurements and understand each instrument's use. Use the list below and collect measurements from the locations described.

SECTION 1

Combustion Gas Detector:

Using a Combustion Gas detector, check the following systems if available:

1. Monitor along the main gas line in the home as it enters from outside and comes to any appliance.

Did you detect any gas? Yes _____ No_____ If so, where on the gas line: _____

2. Monitor along the gas line that leads to any gas appliance that is available. Appliance:_____

Did you detect any gas? Yes _____ No_____ If so, where on the gas line: _____

!!! If no gas is detected, inform class that it is now safe to perform combustion appliance testing !!!

Using the Dragon Puffer Vapor Generator, check the following

Hot Water Natural Ventilation: Turn on hot water. When the hot water heater comes on, check the exhaust airflow at 45 seconds and again at 60 seconds

Exhaust Vent: Flow Direct. @ 45 seconds: _____, Exhaust Vent: Flow Direct. @ 60 seconds: _____

Carbon Monoxide: Using a portable CO detector, check the following systems if available:

Stove

Turn on all stove burners, and oven to 325 ˚F, if possible

Wait 15 seconds, hold detector (firmly) 24-36" above stove burners and collect reading, CO: _____ppm

Wait 45 seconds, hold detector (firmly) 24-36" above stove burners and collect reading, CO: _____ppm

Turn off all burners, but leave oven on-

Wait 30 seconds, open oven door ~2 inches and collect reading above 2 in. opening, CO: _____ppm

Gas Hot Water Heater with Natural Ventilation

Turn on hot water,

Wait 45 sec., place CO detector ~2 – 4" from opening in draft hood & collect reading, CO: _____ppm

Wait 60 sec., place CO detector ~2 – 4" from opening in draft hood & collect reading, CO: _____ppm

Gas Furnace with Natural Ventilation

Turn on furnace,

Wait 45 seconds, place CO detector ~2 – 4" from opening in draft hood & collect reading, CO: _____ppm

Wait 60 seconds, place CO detector ~2 – 4" from opening in draft hood & collect reading, CO: _____ppm

If you have time, try this exercise to find the hidden CO source: In the basement or kitchen of the home have one team member open the provided coffee container while all others are out of the room. When told, return to the room and try to determine where the container was opened by measuring the CO starting anywhere in the room.

Environmental Measurement Worksheet

Student Name: _____ Date: _____

SECTION 2

Portable Psychrometer:
In the Kitchen, measure the following:

Room Temp: _____(˚F) Relative Humidity (RH): _____% Calc. Temp. Dew Point:_____ (˚F)

Surface Temp., interior wall: _____(˚F), Surface Temp., Exterior wall: _____ (˚F)

Notes and Comments: _____

_____

Water Temperature: ***WAIT! UNTIL YOU ARE INFORMED IT IS SAFE TO TURN ON THE HOT WATER***

Turn on hot water. Wait 30 seconds after it starts to become hot, then measure with IR thermometer

Kitchen Faucet Hot Water Temp. _____ (˚F), Bathroom Faucet Hot Water Temp. _____ (˚F)

Moisture Meter:
In the kitchen, measure the moisture content of the inside of the sink cabinet

Location: 1. _____ Moisture Readings: _____|_____|_____|_____|_____
Location: 2. _____ Moisture Readings: _____|_____|_____|_____|_____
Location: 3. _____ Moisture Readings: _____|_____|_____|_____|_____

If you observe a moisture stain anywhere in this home, collect a reading below. If none present, collect readings from the bathroom walls near toilet and/or vanity

Location: 4. _____ Moisture Readings: _____|_____|_____|_____|_____
Location: 5. _____ Moisture Readings: _____|_____|_____|_____|_____
Location: 6. _____ Moisture Readings: _____|_____|_____|_____|_____

Dragon Puffer Vapor Generator:
Check the exhaust flow of the following (be sure to turn on the fan):

Bath Exhaust Vent: Flow Direction: _____, Kitchen Exhaust Vent: Flow Direction: _____

Room Air flow: Pick a bedroom, close the door leaving a 1" gap, puff vapor at the top, middle, and bottom of this gap. What airflow direction do you see for each?

Top of Door AirFlow Direct.: _____ Middle of Door airflow: _____ Bottom of Door airflow: _____

Turn fan switch for the furnace/AC to the "on" position, wait for the blower to come on. Then, check:

Return vent AirFlow Direct.: _____ Room supply vent airflow: _____ Re-check door test above:

Top of Door AirFlow Direct.: _____ Middle of Door airflow: _____ Bottom of Door airflow: _____

Instructor Verification of Skills Training: _____ Date: _____

Healthy Home Hazard Analysis Worksheet:

A. Name at least 3 and up to 5 healthy home hazards observed during the visual assessment of a home

1. _____

2. _____

3. _____

4. _____

5. _____

B. Of the hazards identified above, select two and write a brief summary of why these two issues are home hazards.

Hazard #1_____: Why is this a hazard? _____

_____

Hazard #2_____: Why is this a hazard? _____

_____

C. Using the list of hazards identified in section A above, if you can, try to prioritize each of these hazards below from highest priority to lowest. Indicate whether each is an acute or chronic hazard by circling your choice in the area provided. If you have time, offer one reason for your ranking of each hazard

Hazard Rank #1_____ Acute Chronic Neither

Reason_____

Hazard Rank #2_____ Acute Chronic Neither

Reason_____

Hazard Rank #3_____ Acute Chronic Neither

Reason_____

Hazard Rank #4_____ Acute Chronic Neither

Reason_____

Hazard Rank #5_____ Acute Chronic Neither

Reason_____

Healthy Home Action Plan Worksheet:

Of the hazards you identified, select one and write at least 3
and up to 5 basic action steps that can be taken to remedy this hazard.

1. _____

_____

2. _____

_____

3. _____

_____

4. _____

_____

5. _____

_____

Of the 5 hazards you identified during the visual assessment and listed here, how
many do you think will require assistance from a local home repair professional?

For the one hazard that you drafted action steps for, identify 2 key messages you might
provide as part of your communication about this hazard to the client living in this home.

Message 1. _____

_____

_____

Message 2. _____

_____

_____

Healthy Home Key Messages Check List

Keep it Dry

_____Moisture Sources

- Sinks, water heaters, air conditioning, dryers, washing machines, cooking all creates moisture
- Use exhaust ventilation often to reduce humidity in bath & kitchen
- High humidity levels can lead to mold/bacterial growth and increase viral illnesses
- Home being too dry can also cause issues- dry irritated throats, sinus headaches

_____Humidity

- Want indoor relative humidity between 30-50%
- Can purchase humidity gauge and move it around the home to measure indoor RH.

Keep it Clean

_____Dust Mite

- Hidden. Barely visible to humans. Love Humidity
- Keep RH <50% in the home as much as possible
- To kill mites, wash linens at least once a week in hot water and if possible through hot dryer.
- Vacuum often all surfaces including upholstery, drapes, curtains, throughout home, if present.
- Keep stuffed animals on shelves and off the bed. Throw stuffed animals in dryer for >10 minutes.
- Get allergen covers for mattress and pillows.
- Try not to have drapes in the child's room.

Keep it Contaminant-Free

_____ Volatile Organic Compounds (VOCs)

- Anything that has a scent is a VOC. (Ex: building materials, dry cleaning, candles, new carpet.)
- Also results from off-gassing. (Ex- Perfume is released into the air when it "boils" or volatilizes from the surface of skin upon contact resulting in a VOC fragrance).
- Keep different VOC sources to a minimum.
- Be mindful of what you are spraying into the air. Different fragrances can cause respiratory symptoms for sensitive persons.

_____Home Chemical Use and Medications

- Should be aware of chemical poisoning
- Be sure to use child-proof safety precautions.
- Sprays should be avoided if possible. Wipes or pourable chemicals should be utilized first.

Keep it Pest-Free

_____Integrated Pest Management

- Suggest integrated pest control, decrease food and water sources and make sure gaps and cracks are blocked or covered to prevent use
- If roach infestation exists, boric acid, bait traps, gels can be used. With mice, use snap traps. Use IPM companies for professional help.

Keep it Ventilated

_____Air Circulation

- Supply vents should be uncovered and able to blow and circulate room air. Return vents take air back to system, over the filter and back into the occupied space.

_____Combustion Gas By-products:

CH^4

- Methane or Natural Gas
- Is odorless. Stinky smell is added for safety
- Indicates there is a gas leak.
- Should shut off source immediately, evacuate the area to a safe place and call Gas Co. or Fire Dept. for help.

CO

- Carbon Monoxide
- By-product of gas appliances.
- Should install a CO detector.
- Should place detector as close as possible to the family's bedrooms.
- CO detector alarm at a low level in order to give the family enough time to get out of the home safely.

Keep it Safe

_____Basic Fire Safety

- Make sure smoke detectors are functional.
- Change battery at least once a year.
- Make sure a smoke detector is on each level of the home.
- Make sure a smoke detector is placed near bedrooms or in bedrooms.
- Test detectors at least once a month
- Make sure the family has an escape plan.
- Fire extinguisher mounted in kitchen area near exit for quick access when needed.

_____Basic Electrical Safety

- Receptacle plug covers
- Use outlets with reset buttons if w/in 5 ft of water source- Ground Fault Circuit Interrupter (GFCI)
- Make sure outlets are not overloaded with too many cords.

_____Slip and Fall Hazards

- Be sure to have adequate lighting.
- Railings on all stairs w/> 3 steps.
- Keep rooms clutter-free

Keep it Maintained

_____Discuss maintenance practices

- Have systems serviced at least once a year.
- Educate about importance of regular maintenance to minimize problems.